ISSN 0254-6019

Veterinary education

FAO
ANIMAL
PRODUCTION
AND HEALTH
PAPER

125

Food
and
Agriculture
Organization
of
the
United
Nations

Veterinary education

Fifth Joint FAO/WHO Expert Consultation

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ANIMAL
PRODUCTION
AND HEALTH
PAPER

125

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Rome, 1995

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M-27
ISBN 92-5-103637-3

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INTRODUCTION

In each of the previous consultations selected topics important at the time were discussed, reported upon and distributed to governments, universities and other organizations. Action has been taken to a varying degree by some countries. Reference will be made in this report to progress achieved in the past. Where there has been lack of progress due to financial or other constraints the report may comment and suggest additional action regarded as important for the improvement of veterinary education and services at the present time.

Members of the expert consultation were very conscious of the complexity of veterinary science globally, and the problems of creating optimal conditions where finance, environment, communications and other factors inhibited development. Nevertheless they believe that basic principles must be retained if the profession is to operate to its fullest capacity for the benefit of society through animal production, public health and environmental stability.

The present consultation discussed some topics that are perennial but must be reviewed in the light of changing circumstances, some positive, some regressive. In addition, it makes reference to recent trends in technical applications of veterinary science eg. in public health, aquaculture and environmental matters.

The current pressure by governments to encourage privatisation of public services is affecting veterinary personnel in some countries for the first time. While privatisation has been a significant factor in developed countries for more than a hundred years the concept is relatively new in many tropical areas and must be considered against the background of subsistence, nomadic and remote animal agriculture where incomes are still low.

The consultation touched upon all levels of the professional continuum from student intake through curriculum structure to the different areas of community service and endeavour. In addition it considered the relationship between veterinary and paraveterinary workers at field level. Ideally these should form a team delivering veterinary support to the livestock producer. They represent a link between the diagnostic laboratory and the farmer, offering a transmission line for applied technology in one direction and information gathering in the other. When they work properly they are a powerful force for increased animal production. There is evidence however that this link is sometimes less efficient than it should be. Aspects of the problem are discussed in the report.

At all times the great diversity of input to society by veterinary science must be recognised and national differences understood. The supporting papers set out in detail the problems associated with each of the sectors of veterinary work subjected to examination. The authors both identify inherent problems and suggest possible solutions which should be drawn to the attention of governments and educational institutions.

This consultation has attempted to dissect out the changing face of the veterinary profession and its missions throughout society and the educational infrastructure that must evolve to meet contemporary demands by the agricultural, urban, scientific and environmental interests of nations.

Considerable changes have taken place even since the last consultation. New technologies and communication systems are becoming standard practice. The profession in all branches of activity must recognise the new potentials and adapt to them.

In some areas such as biotechnology, communications, aquatic animal science and environmental science, the changes since the last consultation have been profound. These and other topics deserve more detailed examination on a global basis by the next consultation, the last in the 20th Century.

The consultation noted a submission by the International Veterinary Students Association which had very wide international input, including Eastern Europe. The submission reinforced the concern of the consultation about the poor infrastructure and information base of many veterinary schools. It is for this reason that FAO and the WHO are encouraged to play a more active role in the improvement of veterinary education worldwide.

The output of the consultation (i.e., the recommendations) is presented within Chapters 1-4 which address specific topics. In this way, readers can note the relationship between the issues identified and the recommendations they have generated. Most often the recommendations are directed at international and regional organizations, at times they are addressed to FAO, and in some cases to governments.

ACKNOWLEDGEMENT

A special note of thanks is due to Dr Douglas I. Bryden, the chairman of the consultation. Indeed, this expert consultation will be remembered by those who were associated with it as the "Bryden Consultation"; it was a successful consultation to a great extent because of Dr Bryden's masterful guidance throughout.

EXECUTIVE SUMMARY

GENERAL

The consultation examined the implications for veterinary education of recent developments in several major fields of activity. Changes are occurring world-wide but shades of difference exist from country to country which must be recognised by veterinary schools to meet their national interests.

The areas of veterinary activity selected for detailed consideration were:

-manpower planning;
-private practice and the privatisation process;
-the public service sector and veterinary public health;
-field research and its infrastructure; and
-public health services and comparative medicine.

The consultation identified several major factors that influence current veterinary education and the deployment of manpower. These factors inevitably create tensions for educational and veterinary organizations which must try to adapt to changing situations; they are:

-diversification and expansion of veterinary services;
-contraction of budgets for education and departmental activities;
-new technology; and
-improved international communication systems.

Governments, universities and other organizations should recognise that there is no longer any place for extravagance in the use of manpower and resources. Realism must prevail especially in the educational sector.

MANPOWER PLANNING

Planning begins at the higher educational level. Governments and universities should ensure that graduate output matches national requirements. An internationally acceptable veterinary school is expensive. Steps are now being taken to evaluate the quality of veterinary education in all countries and to establish minimum standards.

The greatest weight of veterinary manpower is directed to support the livestock industries including aquaculture. It is essential for national food production, public health and export income.

Governments should ensure, for economic reasons, that the veterinary infrastructure is adequately supported in central and regional laboratories and extension services. In this way, disease will be controlled more effectively and animal production enhanced.

Governments should recognise the wider scope of modern veterinary services to meet the demands of animal welfare, comparative medicine (medical research), food quality control, environmental control and other fields. These activities are at different levels of evolution in different countries but will expand inexorably as international standards are imposed in economically related regions eg. the EC, NAFTA and APEC blocs.

Individual governments should attempt to estimate veterinary manpower requirements over a 20-30 year period, taking into account all categories of veterinary activity. The recent British and Australian studies may be used as models since they identified both critical parameters and possible fallacies in such a review.

In some countries where animal production is extensive and communications are not fully developed, governments should clarify the respective roles of veterinary and paraveterinary staff at the field level.

PRIVATE PRACTICE AND THE PRIVATISATION PROCESS

In Europe, North America and elsewhere the industrial and social structures have ensured a strong private veterinary sector. The system has been powerfully effective in animal disease control and animal production for a century as disease eradication results prove.

Economic pressures compel LDCs to examine the privatisation of veterinary (and other) services as a means of devolving responsibility from government level to the private sector. While generally supportive of this concept, the consultation was mindful of the fact that the private sector supporting subsistence farming may be dependent on low income farmers (eg. US$150-200 per annum). A system must therefore be devised to reconcile the relationship between a low income industry and professional support. Current models in Uganda, Sri Lanka and China are watched with interest and should be evaluated by FAO after a 3-5 year period and presented to the next Consultation on Veterinary Education for consideration.

Options for privatisation should be collated and analysed; they may include:

private practice supported by low interest government loans;

practice partially supported by government subsidy and partly by private practice (e.g. Scottish Highlands and Islands Scheme); or

private practice supported by farmer cooperatives (New Zealand).

With the adoption of privatisation by LDCs, veterinary schools should give greater emphasis not only to the delivery of technology but also to the economic basis of the system eg. farm economics, practice economics, credit systems, budget control etc.

THE PUBLIC SERVICE SECTOR AND VETERINARY PUBLIC HEALTH

As in other fields of veterinary endeavour, rapid diversification is taking place in the public service sector.

Traditional responsibilities are disease surveillance and control, food hygiene and public health. In recent years government veterinarians have also taken up duties in chemical surveillance, animal welfare, contingency planning for epidemic control and environmental maintenance.

Veterinary faculties must take these developments into account in curriculum design within the constraints of available time and funds. While some information can be transferred to the undergraduate through core courses, more detailed training will depend on elective courses and postgraduate work. Greater use of integrated and multi-disciplinary courses is recommended at the undergraduate level.

Two levels of postgraduate training are recognised and should be supported; namely degree and diploma programs, and in-service training of professional staff through short courses.

The public service role of the veterinary profession should be given greater emphasis by universities, associations and governments.

FIELD RESEARCH AND ITS INFRASTRUCTURE

While veterinary public health is part of the public service sector, its areas of specialisation deserve special emphasis. The contribution of the veterinary profession to human health should be emphasised in the universities, governments and through the World Health Organization. At the educational level the student should perceive the contribution of the veterinarian to public health through:

> food inspection and quality control, including marine products;
>
> collaborative research with the medical profession on communicable (zoonotic) diseases;
>
> basic research on animal diseases as models of human problems eg. diabetes, HIV infection etc.; and
>
> control of chemical pollution of the environment by agricultural and other waste products.

Veterinary associations should give wider publicity to the public health contribution of veterinarians and their national and international significance.

There is a continuing need for multi-disciplinary field research to obtain reliable information on disease and production status. Many countries lack an accurate data base.

The information chain for field research consists of the farmer, the extension services, and the regional and/or central laboratories. While the farmer is a constant, the efficiency of the chain will depend chiefly on the funding and resources of the technical services.

There is evidence that in large countries especially, the extension services have inadequate resources (transport, fuel, materials, salaries, communication systems etc.).

It is imperative in field research that the veterinarian interfaces directly with the production unit whether it is a village, nomadic herd or commercial enterprise.

A field research team should include *inter alia*, farmers, veterinarians, paraveterinarians and where appropriate, socioeconomists.

Research methodology may be taught any stage of the veterinary undergraduate curriculum but it is best taught by staff with practical experience. Training for research will have the greatest impact in the paraclinical and clinical years. Where possible, undergraduate students should be included in research projects with university and government staff.

Greater national emphasis should be given to the training of technologists for diagnostic and research laboratories.

INFORMATION SYSTEMS

In the past decade a revolution has taken place in information systems. Centres of veterinary education should make greater access to these systems. FAO should assist in disseminating information on data systems of all kinds. Particular emphasis should be given to:

-expanded dissemination of international disease data;
-the importance (and cost) of access to scientific journals;
-availability of abstract journals (Veterinary Bulletin, Index Veterinarius, Current Contents);
-availability of international networks by newsletter (Buffalo Bulletin etc.);
-access to specific information systems (Medline, CD-ROM etc.); and
-technological resources eg. facsimile, E-mail.

There is an urgent need to strengthen library holdings of books and journals in many veterinary schools. FAO should actively assist in improving the data base and accessibility to data of veterinary schools especially in LDC.

OVERVIEW OF THE CONSULTATION

As on previous occasions (1971, 1978 and 1984 and formerly) the consultation was designed to focus on several aspects of contemporary veterinary work and the educational foundations they require. Its aim was to produce recommendations which serve as international guidelines for training and facilities especially in developing countries.

There are several problems inherent in the evolution of veterinary education at the end of the twentieth century. The versatility of the veterinary graduate is unique and ranges from clinical and preventive medicine, production farming systems and international disease control, through public health and welfare services to comparative medicine and environmental support. In recent decades, veterinarians have moved into all of these areas through government initiative or personal interest or public demand.

At the same time, veterinary faculties try to identify these trends, some of which have happened rapidly in recent decades, and adjust the structure of curricula to meet diverse interests. Within the framework of a veterinary school based on departments this is difficult educational engineering that requires an objective, enlightened and adaptable staff. There is little chance of expanding the time frame of the course. Faculty budgets generally are contracting. The equation is very hard to solve. It is against this fluctuating background that the consultation set out to define the issues and offer some possible solutions. The consultation included invited papers on the major topics selected. These were supported by discussion papers and considered against the background of previous recommendations. Following specialist group discussions using a modified Delphi format members of the consultation formulated their recommendations which are incorporated in the relevant chapters of the report.

The consultation took into consideration not only the basic structure of changing veterinary courses but also their global diversity. Different national environmental characters, production systems and socio-economic structures cause shades of difference in veterinary training programs, both undergraduate and graduate. Flexibility, not uniformity, is the order of our time. The consultation was therefore directed at five major fields of activity in education and professional goals:

Manpower planning;
Private practice and privatisation of services;
The public service sector and veterinary public health; and
Field research and its infrastructure.

The output (recommendations) of the consultation is now distributed internationally for he consideration of governments, universities, international agencies and other institutions. It is hoped that FAO will be able to take a more active and supportive part in the responses of veterinary schools throughout the world.

PERSONNEL

Fifteen experts serving in their personal capacities as recognised authorities in veterinary education met at FAO Headquarters in Rome to discuss major issues, identify constraints and propose solutions prepared as recommendations. In addition, representatives from FAO and WHO were present. The meeting was formally opened by Dr H. de Haen, Assistant Director-General, FAO; Dr F.-X. Meslin, Chief, Veterinary Public Health, WHO, made an introductory statement on behalf of WHO.

1. VETERINARY MANPOWER PLANNING

POLITICAL IMPERATIVES

The delivery chain of veterinary services includes veterinary graduates, technologists, paraveterinary support staff and the livestock producers themselves. Each has a part to play in controlling animal disease and increasing animal production. Governments should try to understand their respective roles in national production systems when planning manpower development.

Even after more than a century the planning and training systems do not always reach ideal goals in terms of delivery of services. Problems may exist at any level of the chain. They may be related to educational, organizational, geographic or, increasingly, economic factors. Since finance is likely to be a major constraint for the foreseeable future governments and the profession must adapt to the economic environment.

In planning for veterinary manpower, governments and educational institutions must clearly define the roles of their personnel. These will vary according to animal production systems, animal populations and the sectors that employ veterinarians eg. livestock industries, research, public health, urban animal owners, business, environmental agencies etc. The classical curriculum may need modification to meet new trends in veterinary work such as aquaculture, economics and marketing. Manpower planning should therefore take into account future requirements in key sectors. In some countries veterinarians play a major role in animal production services including breeding, nutrition, quality control and marketing.

INFRASTRUCTURE

There is a need to understand the respective roles of veterinarians, paraveterinary workers and the farmers as the traditional pattern may not be the best one. Thus any tendency for the veterinarian to remain in an administrative (ie, office) position might be changed to ensure that the most informed members of the team appear on the farm or village to take part in operations or to assess the progress of a campaign or collect epidemiological data. The lack of reliable data is a universal weakness in many livestock producing areas.

It was apparent to members of the consultation that significant problems existed with two aspects of manpower planning. The first was quantitative, that is the number of graduates and other technical personnel being trained to support a finite social need; the second is the quality of training required for particular livestock systems ranging from nomadic herds to intensive computerised enterprises. In some countries a full range of production systems must be serviced.

Each country should try to estimate the need for veterinary graduates in all aspects of their calling including livestock services, laboratories, private practice, education, industry, veterinary and medical research and so on. It is clear that while veterinarians are in short supply in some countries, elsewhere there is a wasteful oversupply. The number of veterinary schools may exceed national requirements. Britain has recently scrutinised its national requirements critically. Other countries should follow that model. Wastage of manpower can be reduced and the morale of existing graduate personnel maintained at a higher level by improving their facilities.

Adverse trends are not confined to developing countries. The tendency in some more advanced countries to enlist high technology into the paraclinical and clinical departments of veterinary schools may be scientifically exciting, but in the present economic climate, may deplete the numbers of staff capable of teaching the skills needed to support the rural and allied industries. It is important in difficult financial times that veterinary planners stand back and see their national needs in perspective. A 20-30 year time scale may be a suitable yardstick to allow a diagnosis and prognosis of manpower requirements that will avoid a waste of national finance. Governments will demand realistic projections.

FUNDING

Inadequate finance is a salient feature of the governmental scene at the present time and it is unlikely to improve in the short term. Indeed it may become worse. For this reason all governments are scrutinising budgets, analysing cost benefits and usually reducing allocations to departments.

Animal production is a key activity in most countries for national food consumption or export revenue or both of these goals. Especially in the face of increasing human populations the budget for animal disease control and animal production becomes more precious. In general, governments are conscious of the need but at the same time they look for alternative ways of funding veterinary services and education, for example, through privatisation.

Funding related to veterinary services is usually distributed over several ministries eg. education, livestock services and sometimes a separate agricultural research sector. In addition it is hoped that an overview of veterinary science will take into consideration its contribution to public health, comparative medicine, environmental control and other responsibilities in contemporary society, and create appropriate budgets for each country. At the same time governments should avoid the manpower excess syndrome apparent in some countries where too many graduates lead to job dissatisfaction and misplacement of personnel. The key to this problem lies in the higher education sector.

Also within the university sector is the need to widen the financial base not only through government sources but also from other areas of the community that depend on veterinary services. This approach will only succeed if veterinary faculties explain their goals through meetings, public relations statements via the media and informative reports. Key elements in the community are primarily the farmers, including intensive commercial enterprises, veterinary associations, food processing industries and other users of services provided by the schools.

University faculties have a proven record for generating financial support in other ways. Livestock production units used for teaching can be profitable by spin-off of animals or products (milk, eggs). In Europe, North America, Australasia and elsewhere universities are eligible for national research funding that can flow through to the teaching programs and staff levels.

Each country will explore its own system of animal production and possible sources of revenue in support of education, research and government services. Alternative funding is becoming essential to maintain these activities.

RECOMMENDATIONS

R1 Accreditation
International and regional organizations in consultation with the World Veterinary Association and existing accreditation authorities should take a strong lead in promoting and supporting accreditation of veterinary school at national, regional or international levels; they should develop schemes for self-evaluation which can be used by veterinary schools as part of the accreditation process.

R2 National Associations
International and regional organizations should develop and support the involvement of strong national veterinary associations, farmer associations and other major client groups in improving the effectiveness of veterinary education.

R3 The Veterinary Profession
Veterinary schools and national veterinary associations should be encouraged to develop methods of quantifying the contributions of the veterinary profession to national economies and to promote their application by their respective governments and communities.

R4 Veterinary Graduate Numbers
Where there is evidence of excessive, or potentially excessive, numbers of veterinary graduates, the number of veterinary schools and graduates should be rationalised. Emphasis should be placed on quality rather than quantity.

R5 Manpower Planning
Veterinary manpower planning and funding of educational and professional infrastructures should be related to long-term national requirements in the public and private sectors rather than on formulae based on livestock numbers.

R6 Studies of Veterinary Manpower Needs
Technical assistant agencies such as FAO, the World Bank, Regional Development Banks and country development agencies should fund detailed studies on effective and affordable strategies for delivering veterinary and animal production support services (both public and private) to the livestock industries. A study should take into account demographic changes, budgetary realities, size and rate of rural development etc. Studies should be organised on agroecological zones and regions and will require inputs from multidisciplinary groups. Studies should then be conducted on manpower needs for the agricultural and other veterinary domains i.e. number of veterinarians,

paraprofessionals, extension agents etc., and their educational needs. The questions of number of schools, curricular structure, national and regional cooperation etc., can then be addressed.

R7 Information Services
Despite previous recommendations, there are still serious deficiencies in information sources in veterinary schools and veterinary research and service organizations. An urgent and widespread need exists to upgrade libraries, making use of new technology in data bases and international communication.

R8 National Outputs
Funding of veterinary education in member countries should be proportional to the contribution made by the veterinary profession to the national economy through its impact upon livestock health and production, food hygiene, public health and the environment.

R9 National Needs
Member countries should require their veterinary schools to educate undergraduates for veterinary work consistent with national animal production, public health, comparative medicine and environmental needs.

R10 Cost Recovery by Veterinary Schools
Universities should improve financial efficiency and resources and broaden their base of financial support for veterinary education by considering the following methods:

> support from industry, farmer organizations, veterinary associations and other users of output of the colleges;
>
> enhance co-operative teaching arrangements with practitioners (public, private and corporate), livestock producers, processing plants etc.;
>
> initiate co-operative arrangements with other faculties and research establishments to share teaching and specialised facilities;
>
> levy fees from students, veterinarians and clients who receive continuing education;
>
> make veterinary schools eligible for national research funding in areas relating to veterinary medicine and education; and
>
> veterinary schools to manage livestock production units for profit to support teaching, research and service needs.

R11 Obstructive Factors
International and regional organizations should investigate any regulatory factors which may obstruct private investment in veterinary schools and promote their removal or rationalisation in countries with serious deficiencies in financing efficient veterinary schools in developing countries.

2. PRIVATE PRACTICE AND THE PRIVATISATION PROCESS

OBJECTIVES AND ATTITUDES

There is a long tradition in Europe, North America and elsewhere of private veterinary services to the farmer, urban animal owner and other interests including industry. Socio-economic conditions were the imperatives creating a system that generally works well and in animal agriculture increases productivity of food and rural incomes.

Other parts of the world have had different agricultural systems and economic structures. A study of North Africa, Western Asia and South-east Asia today is a study in contrasts. Changes are taking place though very unequally. Improvement comes with economic development and prosperity, improved communications and information systems. Unfortunately deterioration still follows climatic stress and political instability. Generalisations should therefore be entered into carefully. Each country must consider the organizational structure that suits it best, whether for agriculture, veterinary services or any other activity. Advice may be sought but imitation is not always the best solution.

The basic objectives are clear, to increase animal production for food and farmer income. Sustainment of the farming environment is also becoming more urgent as signs of land degradation mount up.

COMPETING INTERESTS

To provide efficient veterinary services the government must take into account a range of activities carried out by graduates for the national good. They include epidemiological surveillance and quarantine, major disease control campaigns, support services for all classes of farmers from extensive to intensive production units, specialised diagnostic laboratories, inputs to animal production operations, maintenance of standards and regulations, quality control of food and other duties. Overarching these responsibilities is the education of the personnel concerned, scientists, technologists and paraveterinarians working at field level. Dramatic economic changes in recent times have given rise to new trends in the provision of services to consumers including farmers.

One of the major thrusts in most countries is to 'privatise'. That is, to devolve responsibility for the supply of services from government to non-government agencies and at the same time to explore the potential for recovery of costs where previous support was subsidised. In the case of the veterinary profession "privatisation" means the development of private practice and the revolution of some government services to the private sector. Such a policy was accepted by the Organization for African Unity Inter-African Bureau for Animal Resources in 1987. The need to legislate for the system was recognised. In the case of veterinary services the aim is to create an economic environment that will allow private veterinary practice to operate.

A number of countries are now exploring the implementation of privatised services including Uganda, Sri Lanka and China. Details of their structure and degree of success are still awaited and will be of great interest to countries grappling with low or reduced GDP. Their effect should be analysed by the next FAO/WHO Consultation on Veterinary Education.

While privatisation may have its place in a country, the economic importance of the livestock industries including the aquatic sector may necessitate a mixed approach with key areas such as higher education, quarantine, disease surveillance continuing to merit partial or complete government support. At the same time possible forms of privatisation can be tested. A distinction is necessary between the intensive producer of poultry, pigs or fish who is able to pay a fee for service or even enter into a contract for service and, at the other extreme, the small farmer whose net income may be $200 per annum. Unless the latter can work within a cooperative his capacity to be cost-effective to a private practitioner will be limited. The cost of drugs and vaccines alone may be unacceptable.

It must also be recognised that a veterinarian may require a bank loan to enter the private sector. High bank rates are already a constraint to private enterprise in some countries. Further work is needed to devise the best equation for private veterinary services where subsistence farming predominates. Farmers may not lack the will to pay, only the cash.

A further structural problem is the respective role of veterinarians and paraveterinarians where both are active at field level. Sometimes, for geographic or other reasons, paraveterinarians play a major part in disease eradication programs. It may be necessary to define more clearly the contribution of veterinarians to disease control policy, field and laboratory diagnosis and other activities.

PRACTICAL TRAINING

The establishment of a private veterinary practice, especially in an environment where farming systems may range from subsistence or nomadic production to commercial enterprises, requires appropriate training at university and continuing educational levels. In addition to the traditional technical education the undergraduate should be introduced to financial and managerial factors that underpin commercial success, that is, reasonable profitability. There is an increasing need therefore for veterinary schools in all countries to include exposure to financial and business methods in the veterinary curriculum. Credit systems, accountancy, cash flow control and computer packages for their management all have their place in private practice. Interaction between veterinary and business faculties may provide the resource. In other cases external lecturers from the banking or management sectors can assist at the undergraduate or post-graduate level.

If privatisation is to succeed it may be necessary for government to intervene to obtain favourable terms for the practitioner in rural areas. Alternatively a partially subsidised scheme would allow the veterinarian to draw part of the income from government and the remainder from private work. The profession is at an early stage of development with these systems in some countries. At all times the primary goal is the efficient production of livestock and food for the farmer and the national economy. Veterinary services are a critical part of the chain. Government must calculate how the service can be most cost effective.

RECOMMENDATIONS

R12 Roles and Services of Various Providers
International and regional organizations should encourage governments to clearly define the complementary roles of the government and private veterinarian and auxiliaries; to use sub-contracts and cost-recovery methods where appropriate to provide the range of animal health services needed by the community; and to review these services with client groups on a regular basis.

R13 Credit terms
Veterinary associations should be assisted in obtaining satisfactory credit terms for veterinarians and other service providers willing to establish private practice to support animal production, and examine options suitable for national goals including: full financial support for veterinary services; partial subsidisation of veterinary services; or integration of private practice within a farmer co-operative structure.

R14 Responding to Community Needs
International and regional organizations should encourage national associations, veterinary schools and individual practitioners to understand the needs and aspirations of communities. The community should be fully informed of the role of the veterinarian, especially in animal production, public health and animal welfare.

R15 Ethics and Quality Services
National veterinary associations internationally should be encouraged to promote professional ethical standards by formulating a code of ethics assuring quality of services provided for the community.

R16 Harmonising private and government veterinary services
International and regional organizations should encourage governments to promote private veterinary practice by the following means: ensuring that the activities of government veterinarians do not compete with those of the private practitioner; encouraging the distribution of veterinary drugs, biologicals and chemicals to private practitioners; contracting private veterinary practitioners to carry out government work where appropriate; ensuring that veterinary education provides new graduates with knowledge, skills and attitudes consistent with effective delivery of both private and public veterinary medicine; and helping to maintain and improve veterinary knowledge and skills through continuing veterinary education programs.

R17 Inputs by Farmers
FAO should encourage governments to take into account the role of farmers in the delivery of animal health care. Governments should therefore enhance the content of extension services provided for farmers to improve the level of livestock management.

R18 Training of Animal Health Assistants (Paraprofessionals)
Governments should encourage the use of animal health assistants preferably under the supervision of veterinarians in the animal health care systems of developing countries where the supply of experienced veterinarians may be inadequate. In the curricula for

animal health assistants, courses on management, rural sociology and basic economics should be included.

R19 Training of Animal Health Assistants

To ensure effective practical training for animal health assistants, international and regional organizations should use government, private and university veterinarians as well as experienced farmers to contribute to courses.

R20 Practical Training of Veterinarians

International and regional organizations should strongly support collaboration between veterinary schools, private and public practitioners, research institutes, production units, processing plants, farm enterprises and smallholder farms to strengthen practical training for veterinary undergraduates.

R21 Training for National Needs

Veterinary schools should be empowered to establish practices (veterinary service delivery units) to meet local needs and/or to manage field research stations from which a commercial practice could operate to provide experience in traditional farming systems for students.

R22 Practical Tuition for Veterinary Students

Veterinary faculties should use experienced practitioners in their training programs to ensure appropriate training of veterinary students.

R23 Training Inputs by Farmers

Veterinary colleges should encourage interaction between veterinarians and model farmers who can provide on-farm experience for students.

R24 Regional Pooling of Teaching Resources

FAO should encourage governments, international organizations and non-government organizations to support national and regional co-operation in the development of teaching resources and programs which will lead to centres of specialisation available for training programs at all levels.

3. THE PUBLIC SERVICE SECTOR AND VETERINARY PUBLIC HEALTH

ROLE OF THE VETERINARIAN IN THE PUBLIC SERVICES

The work of the veterinarian underpins the economy and health of a country in several ways. For this reason there is a long tradition of veterinary public service throughout the world. Among the historic roles are those associated with diagnostic and regulatory control of livestock diseases, research, food hygiene and quality control, animal production support and, with the medical profession, control of zoonotic diseases.

For more than a hundred years the veterinary profession has contributed to international public health through the surveillance of food quality and control of zoonotic diseases. Food inspection has significantly reduced the incidence of infections such as gastroenteritis, tuberculosis and trichinosis. Field programs for the eradication of rabies, brucellosis and anthrax have had a similar impact.

In very recent times the area of public health responsibility has widened considerably to include such topics as the quality of aquatic products, surveillance of agricultural and industrial chemicals, the monitoring of biotechnology and environmental matters, disease risk assessment, and the administration of animal welfare standards. The socio-economic implications of all of these fields are clear and the veterinary profession tries to adapt to the demands of a concerned society. Such versatility demands a broadly based education for the necessary skills and entails profound economic and educational implications.

All of the public health matters listed above have economic implications at the national or local levels. Government is inevitably drawn to provide technical diagnostic or field services in the form of abattoirs, laboratories, specialist personnel and a host of supporting materials. Where the subject is of national importance eg. the quality of export products, the government is naturally conceded and must be involved. Government may also decide that certain services can be sub-contracted to the private sector, a decision now being faced by economically beleaguered organizations even in developed countries. Whether such a move is technically desirable is open to debate.

IMPLICATIONS FOR VETERINARY EDUCATION

The classical structure of a veterinary course is still relevant for the present time. On a foundation of basic sciences beginning at high school level is built an understanding of physiological principles, the paraclinical sciences of pathology, microbiology, parasitology and toxicology and good clinical and epidemiological practice. In parallel with this stream a knowledge of livestock production systems including animal breeding, nutrition and, increasingly, basic economics and sociology is required.

The extending roles of the public service veterinarian merits reconsideration of curricular structure. A logistic problem lies in wait here because of conflicting demands of an increasing number of disciplines. The skill, experience, judgement and tolerance of university staff can lead to a new balance of courses and a fresh approach to teaching methods. In a changing world it is essential that schools adapt to the new world order of things in the animal sciences and related disciplines.

Regulatory frameworks are becoming increasingly international for chemicals used in agriculture, disease control and food preparation. Environmental protection includes the animals therein. Conservation is therefore regarded in most countries as important and in some of them, urgent as species are endangered. Within the domain of disease control epidemiological principles are used in contingency planning which may draw on statistics and systems analysis for decision making. With the recognition of new diseases veterinary public health becomes more complex.

At the field level it is now recognised that the veterinarian should be a good communicator, well versed in rural sociology and a skilful distributor of information. Where animal welfare is a concern the same skills can be used.

Information itself is a new science and technology and, whatever the area of responsibility the graduate should be aware of the resources available for reliable and up-to-date knowledge. Computers, facsimile systems and other technologies have opened up the world to the scientist and international networks are available at any time of day or night. Inability to gain access to these networks still constitutes one of the greatest barriers to understanding the problems of animal agriculture throughout the world. As prime sources of knowledge, universities and government departments must press for information resources.

The effect of the remarkable expansion of public health activities by veterinarians also has a profound impact on veterinary schools. Attention must be given to more than the traditional subjects of food hygiene and zoonoses, and this at a time when resources are generally contracting and the technical base of traditional subjects eg. microbiology is diversifying at a bewildering rate.

For some time now, faculty staff in universities have been attempting to adjust to the demands of an expanding public health arena. In the United States for example increasing emphasis is given to environmental toxicology arising from pollution and other social developments. With the evolution of international standards in economic blocs such as the EC, governments and universities alike must respond in their economic and curricular support.

It is certain that the public health sector will continue to be an active and expanding one in the foreseeable future and it is imperative that the veterinary profession through its associations, international agencies, government departments and university faculties continue to monitor developments and respond to them in a positive way.

EDUCATIONAL METHODS

Universities must meet these challenges in several ways, by accepting the new developments and moulding them into learning forms, devising the optimal methods of presentation and gaining access to the appropriate data. There is scope for integration of disciplines such as anatomy with pathology, microbiology with epidemiology and animal production with farming systems. Multi-disciplinary teaching requires inter-departmental co-operation but the student is the beneficiary in terms of understanding and interest. A broad systems approach can be applied equally to the individual animal and to the animal production unit. Many modern textbooks recognise the principle but it needs enlightened university staff to fully implement the learning process.

A basic assembly of facts is essential for the understanding of every aspect of the veterinary curriculum. They can be further brought to life by adding problem-solving assignments which have the virtue of introducing the student to realistic situations, the limitations encountered and solutions that may be devised. This approach also reinforces the multi-disciplinary and systems approach to investigations in any branch of veterinary endeavour. Some veterinary schools abandon the didactic lecture in the final period of the course and use practical, problem-solving methods alone in the clinic or on the farm.

Students may also be stimulated and educated by the opportunity to undertake elective courses designed where possible to meet future career choices. These may provide a further avenue for exposure to practical work in the laboratory, clinic, farm, village or abattoir where the individual can work with experts in the field. In general there is a need for greater practical experience at the undergraduate level.

VETERINARY INPUTS TO COMPARATIVE MEDICINE

Veterinary graduates throughout the world are increasingly involved in aspects of comparative medicine, that is, the application of animal models to the solution of problems of human disease. The importance of animals in research on smallpox, rabies and diabetes are now part of history. At the present time veterinarians in several countries are leading research projects on the development of diagnostic and prophylactic methods for a range of human aliments. They include HIV infection (AIDS), skin cancer, onchocerciasis and other critical problems of human health today.

RECOMMENDATIONS

R25 New responsibilities

Veterinary schools should be aware of the expansion of public service responsibilities by the veterinarian and take steps to modify the curriculum in appropriate ways.

R26 Teaching Methods

International and regional organizations should:

encourage veterinary schools to place more emphasis on problem identification and problem-solving in the undergraduate curriculum;

encourage veterinary schools to consider the benefits of complementing didactic teaching with experiential learning methods;

establish linkages between veterinary schools and institutions practising applied learning methods;

help to strengthen links between veterinary schools and other facilities in research establishments, government departments, industries, production and processing units and private practices--a register of facilities should be prepared on a national or international basis;

encourage veterinary schools to make greater use of government personnel and facilities for undergraduate training, and practising veterinarians to contribute to teaching programs provided they be given recognition for their teaching roles;

help advertise and improve access for teachers and students to sources of information through access to world data bases and E-mail services; and

encourage veterinary faculties to introduce training programs where passive lecture sessions are kept to a minimum and where group projects in problem identification, problem solving and decision-making are used to better prepare students for their professional work.

R27 Curriculum Revision
Faculties should revise curricula to provide core courses and maintain elective courses with which students can design part of their education under supervision.

R28 Expanded Courses
FAO should investigate the types of extra courses (such as extension methodologies, economics, farming systems, environmental management, farm and practice management, marine science etc.) which should be included in the preparation of future veterinary graduates, and recommend strategies for selecting appropriate courses for local conditions as well as teaching methods.

R29 FAO Veterinary Education Officer
FAO should employ and commit a full-time veterinary education officer to follow up the recommendations in the report. The officer would advise member governments on planning, organization and evaluation of appropriate veterinary educational systems and provide technical assistance in the implementation of educational projects financed by the United Nations Development Program, International Bureau of Research and Development, Trust Funds and other sources.

R30 Teacher Training
Encourage veterinary schools and animal health assistant training centres to train teachers in teaching methods and communication skills.

R31 Moratorium on New Veterinary Schools
International and regional organizations should support the strengthening of existing veterinary schools according to national and regional priorities. International accreditation of schools should be sought before the creation of new veterinary

facilities. Should there be justification to build a veterinary school, its design should be appropriate to local and national needs.

R32 Minimum Requirements

FAO should work with the World Veterinary Association (WVA) and the World Association of Veterinary Educators (WAVE) to disseminate the Veterinary Education Minimum Requirements prepared by the WVA and WAVE. Encouragement should be given to international organizations and governments to help veterinary schools in meeting those standards.

R33 Financial Autonomy

FAO should investigate and report on methods for veterinary schools to:

generate funds;
broaden the basis of financial support; and
conserve expenditure in training facilities.

Information generated should be distributed internationally to all veterinary schools.

R34 Networking Between Faculties

International and regional organizations should help to strengthen links between veterinary schools and other facilities in research institutes, government departments, industries, production and processing units and private practices. A register of facilities should be prepared on an international basis. University faculties should be appraised of available technical advances in international networking including facsimile, modems, E-mail and data banks.

R35 Group Learning Techniques

Group learning systems should be encouraged; for example students should be involved in research projects, practitioners should be released to continuing education seminars, and greater emphasis be given to problem oriented teaching.

R36 Training

International and regional organizations (I&ROs) should encourage governments to maintain efficient veterinary public health services and to be involved in, and work closely with, the private sector and relevant professional groups in the following areas of growing importance:

environmentally "friendly" livestock products;
surveillance and risk assessment in the trade of livestock and their products;
safe application of biotechnologies for foodstuffs and pharmaceuticals;
animal welfare;
environmental issues related to animals; and
applied research in the above fields.

R37 Public Health Services
I&ROs should encourage governments to emphasise the role of veterinary public health services as active partners of the food industry (from farm to processed food of animal origin) for the production of increased quantities of safe food.

R38 Professional Collaboration
I&ROs should encourage governments to facilitate collaboration between public services, veterinary practitioners and other professional groups in the design, implementation and evaluation of national projects for animal production and public health.

R39 Human Health Programs
I&ROs should encourage governments to promote the continued involvement of veterinarians in human health programs. The work of the WHO Veterinary Collaborative Research Centres should be given wider international publicity.

R40 Education for Veterinary Public Health
I&ROs should encourage governments to support a strong educational base for veterinary public health capability in each country in both the public and private sectors.

R41 Comparative Medicine
Veterinary faculties and governments should recognise the role of the veterinary graduate in comparative medicine and give support through educational and research resources. There is a need to expand the traditional concept of the veterinarian concerned with farm or companion animals to include the broader and unique contribution to fundamental biological and medical research. Undergraduate students should be made aware of the potential for veterinary research in comparative medicine so that a quota of graduates are dedicated to this field each year. The potential for research of this kind is equally great in developing countries, given adequate research facilities.

4. FIELD RESEARCH AND ITS INFRASTRUCTURE

SOCIO-ECONOMIC JUSTIFICATION

Our understanding of animal health and production is based on the global research process which continues with the need for new information. At the field level the incidence and distribution of disease must be monitored in all countries and control methods developed. Indices of production and the goal of enhanced productivity require to be followed if the livestock industries are to add effectively to the economic and physical health of a nation.

The aims of applied field research are therefore clear, namely, to increase animal production, enhance farmer income and maintain human health. For this purpose there is a well-defined structure involving educational and research organizations.

INFRASTRUCTURE

All countries have developed facilities for field research and its support. The front line is occupied by the farmer who is the source of information and a key cooperator in any investigation. A series of organizations then exists through the extension service to regional and perhaps central laboratories without which accurate data is unlikely to emerge. Productive research in the animal sciences is likely to be multi-disciplinary and a team approach is recommended. This is not always easy to accomplish if the project involves different organizations with separate administrations. An effort may be needed to overcome barriers to efficiency.

Field research may be carried out from different bases. At the farm or village itself veterinary services investigate disease, apply quarantine measures, supply and collect information and supervise control programs. A research element can be built into any of these activities but preferably with laboratory support when diagnostic or epidemiological methods are necessary.

Abattoirs are a productive source of research projects such as disease or production surveys. They can be a springboard for traceback studies in the farm or district of origin of the livestock. Combined with laboratory work, the organs, blood and other materials may yield valuable epidemiological information in cross-sectional and prospective reviews.

There is an urgent need for accurate field data in many countries which is essential for the implementation of effective control measures. Given sufficient information of the proper kind computer systems can provide detailed insights into the incidence and dynamics of disease in all classes of economic animals.

While much of the responsibility for these operations is taken up by governments the educational sector contributes through the quality of its instruction and should also be encouraged to engage actively in research.

TEACHING AND RESEARCH AS COMPLEMENTARY FUNCTIONS

Veterinary education at all stages can express the principles of research in both theory and practice. The identification of problems, the idea of hypothesis, methods for solving the problem, and skill in interpreting results can be taught in any subject. They are most likely to be introduced to students by teachers who are also research workers keen to communicate some of the excitement of research and new knowledge. Information transfer of this class is a sign of an intellectually active university.

If a practical research element is to be included in undergraduate studies the teacher must stand back and see his discipline and those of his colleagues in perspective. At the present time there is pressure on curricula from new information, new subjects and sometimes diminishing allocations of time. The experienced lecturer will be able to adapt. There is no shortage of printed material in many countries. Some universities cease lecturing in senior years and concentrate on practical and research-type exercises.

To engage in field research however, the student must have access to field material, not always easy in an urbanised faculty. The clinical and paraclinical years are most adaptable to field experience either through direct farm work or contact with samples from livestock. Alternatively exercises may be based on data drawn from practical situations. Epidemiological work can be usefully carried out in this way.

Research can equally be focused on the production sciences from a study of the total farming system and its economic structure to investigation of aspects of nutrition and breeding. The work need not be complex but should be clearly designed in its aim, methodology and in the final interpretation. The early location of animal production subjects in the curriculum may allow exposure to research methods including statistical analysis, which can be applied to nutrition, breeding and indices of fertility.

GRADUATE STUDIES

The graduate with some experience of field or laboratory investigations is already alerted to the potential of applied research. The opportunities for work at the graduate level are immense. They may employ methods from an ever-increasing array in all disciplines and from the sophisticated to the relatively simple. Both at the graduate and undergraduate stages there is an imperative at the present time to identify and select topics of economic value. These are not difficult to find.

In both graduate and undergraduate work cooperation with external government or industrial agencies is to be encouraged by universities. The experience will be invaluable to the student because of its relevance and, in the best circumstances, beneficial to all concerned including the livestock producer. Access to information will be improved and all participants can have the use of an expanded range of facilities. In the economic circumstances of the present day such rationalisation can only be beneficial.

A broad infrastructure of graduate programs is now available internationally to meet the need of animal scientists in all disciplines. They consist of intensive advanced courses, to Diploma and Masters level, Masters and Doctoral research studies and combinations of these methods. Institutions generally explain the depth of study and indicate their applicability at field level. While they remain mindful of the value of basic research university staff should retain an interest in the place of applied studies in the animal sciences.

IN-SERVICE TRAINING (CONTINUING PROFESSIONAL DEVELOPMENT)

More emphasis is being laid world-wide on the need for graduates to stay in touch with new developments in their field. Governments are encouraging staff to take part in programs, usually in the form of short courses, on scientific, economic, communication and managerial topics. This is an efficient method of transferring technology and information. Personnel can also be advised about ways to link up with the information expansion through personal networks or electronic pathways. Much of the global information on veterinary and allied sciences is now as close as the nearest computer terminal at which part of a training program may be based.

RECOMMENDATIONS

International and regional organizations should:

R42 Advise member governments to more clearly identify research objectives and to promote the value of economic research topics among undergraduate students who may contribute to the collection and delivery of data, information and services.

R43 Encourage veterinary schools to assess the value of research outcomes to the national economy, to communicate this value to funding sources and help to deliver the benefits of research to those in the field.

R44 Encourage veterinary schools to include basic livestock economics and management early in undergraduate curricula.

R45 Urge veterinary schools to support academic staff in relevant field research and give them credit for pursuing it.

R46 Critically analyse published data and statistics before the selection of research projects and encourage early training in research methodology for undergraduates.

R47 Promote the involvement of field officers and practitioners in data collection and Community projects, through professional associations and universities.

R48 Recognise the need for a multi-disciplinary approach to field research and the inclusion of socio-economists in animal-oriented projects.

R49 Help to inform governments of the high cost of veterinary education of quality and the need to develop adequate budgets for veterinary schools.

R50 Encourage veterinary schools to make training for field research a goal of the veterinary curriculum and to provide instruction in statistics, epidemiology, research design and methods. Students should complete a research project under the direction of a mentor.

R51 Promote the development of Diploma or Masters level training programs in epidemiology and preventive medicine for veterinarians in lesser developed countries. Such programs should be designed and funded to serve the needs of a region. The goal of the course would be to better prepare veterinarians for leadership roles in animal disease control, veterinary public health and environmental protection programs.

R52 Encourage the development of post-graduate programs in regions where they are not yet present. Donors should give high priority to regional graduate development.

R53 Urge research organizations to collaborate with veterinary schools in the planning and conduct of projects and educational courses for research.

R54 Spur veterinary schools to establish contact with a wide range of livestock production facilities including aquatic units. These may be used as a means to problem identification and investigation as well as general teaching resources.

R55 Encourage better use of resources by, for example:
- avoiding duplication;
- merging existing teaching and research structures where possible;
- improving communication between existing facilities;
- critically appraising priorities; and
- using students, paraveterinarians and other auxiliaries in research projects.

R56 Encourage access to strong epidemiological and statistical units within faculties to support research teaching and field research.

R57 Instigate the development of courses to train laboratory technicians, preferably on a regional basis, who will support staff in veterinary schools and research establishments. Instructors should be highly qualified in the specialist areas. Countries should create promotional pathways for technologists.

R58 Promote the development of courses to train research leaders who will offer programs for animal health technicians assistants for research support.

R59 Advise ministries of education, agriculture, health, and private institutions to emphasise the teaching of languages extensively used in scientific literature.

R60 Make member countries aware of the importance of field research and the consequent need for vehicles, cold chains and other equipment.

R61 Support the creation and exchange of regional Information Systems.

R62 Incite graduate students studying abroad to carry out research on problems relating to their own country, or use data from their country.

R63 Encourage the use of research in the undergraduate curriculum and the inclusion of research workers in teaching and supervision. In addition, it should be recognised that research experience is essential for a teacher to be able to evaluate the subject of his specialisation.

R64 Promote the interaction between lecturers and research staff by joint seminars, conferences, journal clubs, clinical rounds etc. where both teaching and research staff participate. Research staff may acquire honorary status at university.

R65 Advocate the inclusion of criteria for promotion of faculty members based on research activity and the use of research as a teaching method.

R66 FAO should strengthen its own information system through more accurate and comprehensive data collection in member countries.

SUPPORTING PAPERS

5. VETERINARY MANPOWER PLANNING

Eryl Pitt - *Human Resources Planning*

It has been concluded by the World Bank and the Asian Development Bank (AsDB) following reviews of their respective investments in livestock development in developing countries, that returns on investment have been very low. In veterinary services in Sub-Saharan Africa, rates of return from World Bank investment were negative.

Most World Bank and AsDB investment in veterinary services has been in the public sector, where capital funds for buildings, equipment, materials, training and consultancies were provided under the development loans, but government budget allocations for the upgraded operations were far from adequate to cover manpower mobilisation and transportation, repairs and maintenance, and replacement of disposables and essential equipment.

Facilities such as laboratories, vaccine plants, educational and training facilities including veterinary schools, have been insufficiently funded by the respective governments to become fully operational, and have typically fallen into general disrepair, operating at only a fraction of their potential capacity and capability.

Veterinary staff especially employed and trained to man some new facilities, quickly lost many of their new found skills financed under the respective projects, due to lack of exposure and suitable work, to become disillusioned and sometimes bitter and even preoccupied with politics.

Additional veterinarians employed to staff expanded field services under projects which constructed and upgraded clinics, and provided transportation and veterinary drugs, instruments and equipment, became idle when the veterinary drugs ran out, the transportation broke down or ran out of fuel, and equipment broke or was lost etc. The "private" veterinary practices which sprang up in their place, typically from the government facilities, are generally of very poor quality due in large part to inadequate veterinary and "people" skills and inexperience of the new entrepreneurial veterinarians involved and their lack of veterinary facilities and resources. Animal health assistants with longer experience and better basic skills have usually provided better services than the veterinarians.

Few projects had provisions for any form of cost recovery to adequately cover the costs of maintaining the new facilities, and financing the increased activities of the better trained manpower. Where cost recovery provisions were provided they were generally inadequate, or poorly administered, so had minimal impact.

In many cases, extra funds provided for veterinary service developments have come at the expense of overall operational budgets, resulting in a general decline in veterinary services to the livestock industries at large. It is this aspect of veterinary services that has caused the greatest negative impact from investment in livestock in developing countries.

A serious consequence which has led to irreversible damage in many instances to national veterinary services, has been the loss of skills and a major decline in the morale of veterinarians employed in the public sector, as their skills deteriorated through insufficient professional activity.

The problems have been accentuated by a decline in veterinary education in some developing countries - primarily as a result of over-dependence on government funding, and undue influence of political forces and declining budgets relative to the number of students being trained.

A serious decline in the quality of veterinary education has occurred where governments allow more students to be admitted than is financially sustainable. The effectiveness of the veterinary profession has been seriously undermined as a result leading to waste in investments in livestock industry development.

Inadequate operational budgets in government funded veterinary colleges have resulted in a serious decline in the availability of material for, and the general quality of, hands-on practical work in the laboratory, the field, the clinic and the surgery. Lack of practical experience has resulted in recently graduated veterinarians being seriously impaired in their confidence in their own skills when joining the workforce, compromising their capacity to develop their professional skills in the work place.

Involvement of government in the procurement system has resulted in inappropriate and inadequate facilities being provided from capital budgets, particularly under large externally assisted development programs. Two "upgraded" veterinary schools I visited in an Asian country after the completion of a large national education project, had new buildings but few truly functioning facilities in spite of several million dollars invested by the World Bank for resources and staff training.

The imposition of low government pay scales discourages experienced and better qualified people becoming involved in teaching in the veterinary colleges. Lack of flexibility in government employment policies commonly limits the capacity of veterinary faculties to employ good people on a part time basis. This I consider a serious problem in developing countries because of the great importance the "role model" of experienced and competent veterinarians play in the development of effective veterinary professionals.

Since the development of veterinary services in developing countries by governments has failed so badly, it is reasonable for development agencies to conclude that veterinary services must be privatised. This might be true to some extent, but as is being found in other industries, privatisation cannot be used as the panacea for solving all problems brought on by many years of government neglect. Privatisation will only effectively happen if governments strongly support a program of gradual transfer of veterinary services to the private sector, and make the appropriate structural adjustments. In this respect the role of government in the provision of veterinary services needs to be redefined in the context of the new realities of a governments' fiscal frugalities, so that those functions provided by government can be adequately provided. At the same time opportunities for increased private veterinarian involvement need to be identified and strongly nurtured by the public sector.

However, redefining the role of government, and identifying the private sector opportunities for rebuilding veterinary services from the parlous state many have reached, is proving to be far more difficult than was originally envisaged. Most veterinarians in developing countries work for the public sector and have attitudes about the provision of effective veterinary services derived from the heady days when government veterinary services were more adequately funded. Accordingly, their own perspectives see the only solution to the problem as being increased government spending and a return to yesteryear, which of course is a non-solution.

Major limitations on government budgets are here to stay, and unless we adjust to this reality the present deterioration of veterinary services in developing countries will continue.

A major problem is that developing country veterinarians have had little exposure to the potentially wide ranging roles they could play in the private sector if they were well trained. A well run private veterinary practice can have a very large impact on the productivity of the local livestock industries.

Although increasing investment in corporate (large intensive) animal husbandry, veterinary drug and chemical production and supply, and hygienic meat production have provided new opportunities for veterinarians in developing countries, these will remain limited if there is not a major refocus by the profession on the direction veterinary services are taking. Only the veterinarians themselves can do this because only they can comprehend the depth and breadth of their own skills. And this is where the crunch is!

Veterinarians in developing (and developed) countries should be educated to identify the new opportunities emerging in livestock development (including fishery) in the new world, and determine how best to capitalise on them. This will need to be a major focus of a modern veterinary course. Although few economic planners are yet aware of it, substantial upgrading of veterinary services in the developing world would have a major impact on rural development and poverty alleviation, because of the special one-on-one relationships veterinarians can develop with individual livestock raisers.

Livestock development provides one of the truly cost effective options available to developing countries for stimulating strong sustainable economic growth from the bottom up. Smallholder livestock are an important part of the social fabric of a large proportion of most developing country's populations, and any improvement to the productivity of these livestock can have a direct impact on the household incomes of thousands or even millions of people. There are few other rural development strategies that can have such a direct impact at the grassroots level.

Take the adoption of V4 Newcastle disease vaccination in village chickens as an example. Most rural households raise a few chickens at least, and the control of Newcastle disease would have an enormous impact on rural economies for very little investment. Veterinarians should be at the forefront of promoting such activity for their own and rural industry benefit.

However, with the major development banks now convinced that widespread livestock development among rural families has become an impossible dream, further investment in specific livestock development projects has become a reduced component of their portfolios.

Developments in the livestock sector, as with other initiatives in LDCs, will become increasingly dependent on the establishment of an environment which encourages private sector investment and participation (including veterinary education), with a minimum of public sector involvement. However, it is most unlikely that governments in developing countries will allow any significant privatisation of university education, and thus of veterinary undergraduate education as such - in the short term at least. Private investment in veterinary education would therefore be mainly in post-graduate education and training, where it would focus on the specific needs of the emerging livestock industries - rather than attempting to overcome the wholesale deficiencies of undergraduate education.

With increasing investment in agribusiness based on the production of quality hygienic meat and the intensive production of fat cattle, chickens and pigs, new opportunities will emerge for veterinarians with specialist skills in high technology husbandry, disease control, meat processing and production economics. In fact, many decisions to invest in these industries in developing countries are becoming increasingly dependent on the availability and demonstrated capability of the national veterinary services to respond to the new challenges associated with modern livestock production technologies.

In rural development involving smallholder or tribal livestock, where most of the future livestock development will occur, veterinary comprehension of smallholder and subsistence farming systems and communication skills will be the most important. The ability of veterinarians to communicate directly with individual farmers, small traders dealing with farmers and rural household members generally determines the efficiency with which livestock production information is transferred. The poorer the information transfer mechanism, the poorer the quality of the veterinary services. By working with groups of organised farmers the efficiency of information transfer can be markedly enhanced, such that many new services can be economically provided that would otherwise have been denied the smallholder farming community.

By working directly with farmers in the treatment of their animals, young private veterinarians can establish the types of relationships that lead to the successful establishment of working farmer groups, through which other services such as credit, input supply and marketing can be provided, with the veterinarian playing the role of a "broker". This approach is increasingly becoming the process by which young veterinarians employed in the private sector or in private practice, are establishing their services to smallholder farmers.

Young entrepreneurial veterinarians that I have had contact with in Asia and Africa have partly financed the establishment of their private veterinary practises by doing just that, in addition to assisting businesses and agencies in providing services in (i) credit delivery and supervision, (ii) the supply of veterinary products and feeds, (iii) the breeding and distribution of improved livestock, (iv) milk collection including in quality control etc.

Through the establishment of strong communications links with smallholder farmers, private veterinarians can attract more work from the increased exposure to farmers, and from

NGOs and commercial companies dependent on farmer organizational development, for the successful introduction of their services.

The entrepreneurial skills these private veterinarians displayed in taking such opportunities is rare among young graduates educated in LDCs, due to lack of the type of exposure I, for example, had in a developed country. Young veterinarians in developing countries have little exposure to busy developed private veterinary practices embracing a wide range of technical areas. Such exposure is an essential element in preparing new graduates for private veterinary practice.

I propose therefore that the modernisation of veterinary courses in developing countries should be based on the establishment of role models in and outside the faculty to which the young graduates can be constantly exposed. These would be highly experienced private practitioners from other countries employed in the faculty, and commercially managing private practises operating independently of the faculty where undergraduates could spend time. In addition, the faculty should run its own veterinary practice in which potentially profitable programs, that could be implemented by private practitioners, are tested and developed using commercial principles, for potential adoption in the private sector.

Veterinary curricula should be adjusted to achieve the new objectives. New minor subjects such as production economics, commerce, farming systems, extension methodologies (including farmer organizational development), environmental management etc. should be introduced, while topics such as poultry, pig and cattle pathology, computer based ration formulation, meat handling and hygiene, virology etc. should be upgraded in existing courses to provide the level of understanding of sophisticated technologies necessary for servicing modern livestock industries. With the rapid development of modern teaching aids etc., time spent in learning the traditional veterinary subjects could be substantially reduced, thus making way for the new emphases.

Particularly with the rapid change that should occur in the nature of veterinary services, and the present poor state of veterinary services in many developing countries, major emphasis needs to be placed on post-graduate education. This would probably have to be organised through the universities with the assistance of private foundations. I would envisage post-graduate education financed primarily by the veterinarians themselves and vitally interested companies involved in veterinary drugs and intensive livestock production, having the primary objective of equipping veterinarians with the knowledge needed to improve their present services, in the development of new services, or in making adjustments to changing circumstances such as severe drought, the collapse in commodity prices etc., in their own practices. This approach is a far cry from what has traditionally been understood as post-graduate education based on higher degrees or updating of research findings. The Veterinary Post-Graduate Foundation of the University of Sydney provides a very effective model for the development of this type of modern education.

To ensure adequate funding of the upgraded veterinary faculties and avoid the traps of the past, innovative funding methods will have to be found. The charging of fees with a generous scholarship scheme, and the establishment of a foundation by private sector contributors to finance veterinary faculty development could be options. Veterinary schools move away from total dependence on government funding and regulation must become a high priority among veterinary manpower planners.

Jean-Germain Gros - *Empowering the Powerless: A New Approach to Veterinary Manpower Planning in Sub-Saharan Africa*

ABSTRACT

As a result of the economic crisis that has afflicted much of sub-Saharan Africa during the past decade or so, many countries have embarked on a process of economic restructuring. African states, whether voluntarily or under pressure from donors, have become much more conscious of the policy choices they have to make, given very limited financial resources. This position paper argues that veterinary manpower planning will have to be reoriented toward paraprofessionals and farmer training. *Grosso modo*, the wisdom of this strategy lies in the fact that it saves resources without sacrificing basic service quality. Using Cameroon as an example, the paper argues that the supply of veterinary doctors is not adequate to sustain a competitive system of veterinary care delivery (though it may be adequate to meet the needs of African countries for highly complex tasks) in which providers are expected to perform a wide array of tasks. To fill the void, the paper advocates a manpower strategy that incorporates paraprofessionals and farmers into whatever new delivery system(s) are created, mainly as primary care providers. While acknowledging that this proposition is not a panacea (and indeed it is, to some extent, contradictory), the paper strongly suggests that it may be the most economically efficient in certain countries. The empirical evidence presented are drawn from a Cameroon study; however, the conditions described in this paper and the recommendations made by the consultant probably apply to most Sub-Saharan African countries.

FOREWORD

Contemporary reforms in veterinary manpower planning can be examined from at least two angles. Manpower reforms may involve a shift in the delivery system from public to private sector practice, in addition, they may also involve increasing the supply of veterinary manpower by investing in capacity-building, regardless of the nature of the delivery system. What this position paper tries to do is to focus on both aspects of the reform process. In the first instance, the consultant is concerned with how the supply of animal health care providers might be increased by shifting scarce resources from one category of providers to another; in the second, there is an interest in seeing that animal health providers become private practitioners in rural areas. The paper does not focus at all on the delivery of veterinary services to urban owners. Furthermore, throughout the essay it is assumed that any increase in veterinary manpower will be publicly financed; in this sense the analysis that follows is inherently state-centred. The reason for doing this should be self-evident: the paper was written for a consultancy; the writer is hoping that the arguments presented here will be explored by international donors and domestic policy makers. It should be emphasised, however, that it is not essential and universal that public resources be spent to improve manpower in any domain (the necessity of this strategy will vary from one country to the next). The law of supply and demand dictates that rational individuals will supply what is being demanded (including automobiles, shoes, and, yes, veterinary skills) if it is in their economic interest to do so. The private financing component of veterinary manpower planning is not examined at all. Although such an exercise may be essential for countries facing economic difficulties. Finally, the paper does not explore ways in which different types of animal health providers (eg., veterinarians and nurses) might play a complementary role in the emerging delivery systems. The paper favours the inclusion of paraprofessionals as private practitioners, but does not explore the terms of their participation. This too is a key issue that deserves serious attention.

INTRODUCTION

The Central African country of Cameroon is one of an increasing number of Sub-Saharan African states that are experimenting with a private system of animal health care delivery, having had a state funded system for much of its history (Gros, 1993). The reason for this shift is due primarily to the economic crisis (popularly referred to as "la conjuncture") the country has had to face over the past decade or so, and the "opportunity" the crisis has offered for considering alternative ways of providing goods and services, without direct and significant state involvement. This position paper argues that (a) in African countries such as Cameroon the supply of full veterinarians is inadequate to sustain a competitive private system of veterinary care delivery, and (b) given current economic conditions throughout Africa, it is not financially possible for many states to increase the supply of veterinary doctors by supporting their training and to offer them automatic employment upon training completion, as was the case in the recent past. As a matter of economic efficiency (to be defined shortly), the paper recommends that resources be shifted toward the training of paraveterinarians and farmers, primarily as primary care providers; that manpower planners enlarge the scope of their mission to include not only increasing the supply of qualified personnel but also that of veterinary inputs (i.e., drugs, instruments, transport, etc.); and finally, that veterinary training in Africa be strongly oriented toward private sector practice.

THE SUPPLY OF VETERINARIANS IN CAMEROON AND ITS PROBLEMS

In Cameroon today, the total number of full veterinarians probably does not exceed 125, for a cattle population of about 3.5 million heads (personal interview with Dr Noel Chabeuf, the World Bank). Stephen Sandford, formerly of the International Livestock Centre for Africa (ILCA), has identified three levels of functions and the corresponding staff to livestock unit ratio that is appropriate for "effective" service delivery. First, where staffs are concerned principally with visual diagnosis, mass vaccinations and/or quarantines, Sandford estimates that a staff intensity ratio of 1 high-level staff (i.e., a full veterinarian) per 200,000 livestock units and 1 auxiliary (i.e., a veterinary nurse) per 7,000 - 10,000 livestock units is "appropriate." Second, where staff functions include more sophisticated diagnosis, preventive service delivery to individual herds, and a modest amount of extension services to livestock producers, he estimates a ratio of 1 high-level staff per 10,000 - 30,000 livestock units and 1 auxiliary per 1,000 - 3,000 livestock units to be "adequate". Finally, for high level staff only, Sandford estimates that where they are expected to carry a full range of services, including curative care to individual animals and comprehensive extension services to producers, a ratio of 1 per 5,000 livestock units is appropriate (Sandford, 1983). Assuming that all of the 125 Cameroon veterinarians are likely to become private providers (a highly unlikely scenario, for some veterinarians will opt for public sector employment), we would end up with a high-level staff to livestock units ratio of 1 per 28,000 (3.5 million/125), a ratio well above what Sandford estimates to be appropriate for a comprehensive system of animal health care delivery.

Relatedly, at least 70% of the livestock ministry's expenditure is allocated toward staff salaries (Republic of Cameroon, 1987). Although this consultant lacks a detailed breakdown of the wage bill consumed by different types of animal health providers and ministry workers (for example, full veterinarians versus veterinary nurses, or veterinary providers versus administrative staff), it is probably safe to assume that the salaries of full veterinarians represent the largest share of staff expenditure, since veterinarians occupy higher posts than their paraveterinarian counterparts. If one agrees, as this consultant tends to do, with Michel Tacher's assertion that veterinary care delivery in Africa will be ineffective unless at least 40% of total expenditure is devoted to inputs (and support equipment), then it is again safe to conclude that in Cameroon and other African countries, veterinary personnel lack what is necessary to do their job properly, because of the imbalance created by the wage bill (Teacher, 1988). To correct this problem, donor agencies have insisted that African countries stop hiring new graduates while encouraging those who are already on government payroll to become private practitioners. To this consultant's best knowledge, donors have not been nearly as adamant in insisting that manpower planning be reoriented toward paraveterinarians and farmers in order to reduce (at least in the long run) the share of the budget devoted to staff salary.

Two conclusions may be drawn from the analysis presented this far. First, it would appear that, in the absence of full use of paraprofessionals (eg. nurses and adjunct-nurses), animal health care reforms in Cameroon (and other African countries) are likely to be impeded by an inadequate supply of providers. Given the range of services that veterinary providers are expected to deliver, there are just not enough veterinary doctors in Cameroon to adequately and competitively provide services to all livestock farming regions in the country. Second, even if the Cameroon state could increase the supply of veterinarians in the absence of steering new graduates toward private practice, the share of expenditure going toward salaries would likely increase thereby leaving even less for vital input purchase. Hence veterinary manpower planning in Cameroon faces somewhat contradictory challenges: an inadequate supply of highly-trained veterinarians capable of delivering the wide range of services that is expected of them, coupled with the fact that the existing supply already weighs heavily on the state's payroll. The problem does not end there, however. Reforms in manpower planning are all the more necessary given the propensity of full veterinarians to practice in the urban areas.

THE PREFERENCE FOR URBAN-BASED PRACTICE

All of the ten or so veterinarians who are practising (or who have been granted the permission to practise) in the private sector have settled in the major urban centres of Douala, Yaounde, and Bamenda (personal interview with Dr Dana Oumarou, provincial delegate of the Cameroon Ministry of Livestock, Fisheries, and Animal Industries, Adamaoua province, April 1993). As far as this consultant knows, no one has set up private practice in the rural areas, where the need for veterinary services is likely to be most acute. Veterinarians seem to have a distinct preference for urban (or semi-urban) private practice and for good reasons. According to this consultant's investigation, full veterinarians prefer to practise in the cities because of greater overall comfort, proximity to their family, colleagues, and clients, and greater access to veterinary inputs. In addition, amongst veterinary doctors there is a distinct bias against rural practice because of the widely-held (but largely incorrect) view that demand for veterinary services by Cameroon farmers is too weak to sustain private practice. This is a void that paraprofessionals might help to fill, for their level of training and lifestyle are considerably more modest than those of full veterinarians. As a result, the amount of compensation that paraprofessionals might be expected to require is likely to be lower than that of full veterinarians and thus within the financial reach of the average African farmer.

ECONOMIC EFFICIENCY AND SERVICE QUALITY: IS THERE A CONFLICT?

From an economic efficiency standpoint (defined by Barnum et al., 1992, as the least-cost mix of the inputs that will produce at a given level output, given various combinations of inputs) it makes more sense for African governments to improve manpower by investing in the training of veterinary paraprofessionals rather than full veterinarians. With scarce financial resources, a greater number of paraprofessionals can be trained than full veterinarians. The savings generated by investing in paraprofessionals could then be used to purchase vital inputs such as drugs and instruments. In addition, rural practice may be most easily sustainable if the practitioners are paraprofessionals rather than full veterinarians, for the services of the former are likely to be cheaper than those of the latter. Hence, the delivery of services by paraprofessionals may create greater access, especially for small livestock producers. The argument that has been made against too heavy a reliance on paraprofessionals is that the quality of services delivered by them will inevitably be inferior to those delivered by full veterinarians. There is evidence to suggest that the quality problem is overblown.

In a 1991 study of animal health care reforms in Cameroon done by this consultant, it was found that the most common tasks performed by veterinary professionals in all categories in Cameroon are related to administration (2). A wide range of tasks fall under the rubric "administration." In addition to general administration (record keeping and the like), this category includes tax collection, meat inspection (which is really a public health function), and even conflict resolution between livestock owners and farmers. To the extent that veterinary professionals and paraprofessionals are engaged in practising their craft, those at the bottom of the hierarchy (i.e., adjunct-veterinary nurses and veterinary agents, also called inoculators) tend to be engaged in providing routine services such as deworming and trypanosomiasis treatments, whereas the more "complex" procedures, which are rarely performed, tend to be performed either by experienced subordinates or by local "hierarchs" (veterinary nurses in particular). The volume of "complex" services, as defined by the number of times they are performed in one month, is so low that many of the respondents in this consultant's study either did not answer the question, as they were expected to in the questionnaire, or answered it in terms of how many times they delivered curative services in one year! These disappointing results were also recorded in another study by Dr Eric Thys on the activities of veterinary officials in Cameroon in 1989-90 (Thys, 1990).

Thus, paraprofessionals are already widely involved in service delivery in Cameroon and probably much of Africa. Full veterinarians rarely participate directly in service delivery; their role is largely administrative. This consultant's work in Cameroon suggests that farmers are largely satisfied with the services provided by paraprofessionals, as will be seen shortly.

The study asked the respondents to separately rank the quality of the curative and preventive services they were receiving. A strong majority of the respondents had a very positive opinion of the quality of vaccination services. Seventy-three percent of those surveyed (225) considered quality to be "excellent" or "very good", while 27% ranked quality as either "good" or "fair"'.

"Large" producers, according to the Table, tended to rank vaccination services quality higher than "small" or "very small" producers. This is very interesting in view of the fact that as a group, "large" producers tended to spend more on vaccination services than their "smaller" counterparts. How do producers rank curative care quality? Table answers that question.

Again, the trend seems to be that "large" producers tend to rank curative service quality consistently higher than their "very small" counterparts. This result is remarkable in view of the fact that "large" producers consistently paid more for similar curative services than "very small" ones. But the main point here is that Cameroon farmers appear to be very satisfied with the services they received from paraveterinarians; and one way (certainly not the only one) of measuring the effectiveness of any health care system, whether it be human or animal, is to measure the degree of client satisfaction with it. Based on the latter consideration, paraveterinarians would appear to have passed the test.

In addition, African farmers do not necessarily draw a distinction between full veterinarians and paraprofessionals. Cameroon farmers, as well as apparently those of Kenya, tend to refer to all animal health providers as "doctors"; they do not seem to distinguish between those who are doctors proper and those who are nurses, adjunct-nurses, and the like (Leonard, 1987). To the extent that paraprofessionals already deliver the bulk of veterinary services; that clients (i.e., farmers) are "satisfied" with the services provided by them; and that clients do not generally differentiate between various categories of animal care health providers, it makes little sense for African governments to continue to invest in highly trained personnel for the purpose of service delivery.

Finally, many of the major epizootics (rinderpest, blackleg, contagious bovine pleuropneumonia) are not treated in Africa, although preventive measures including vaccines have helped to reduce the frequency of outbreaks. The types of treatment that are routinely

Table 1: Economic Status and Vaccination Services - Quality Rating

	Excellent	Very Good	Good	Fair	Total
Very Small	15	56	26	3	100
Small	12	42	37	8	100
Medium	24	61	14	0	100
Large	31	53	8	8	100
Total	20	53	22	5	100

	Value	DF	PROB
Test Statistic			
Pearson Chi-Square	9.920	9	0.018
Likelihood Ratio Chi-Square	22.286	9	0.008
Coefficient			
Spearman Rho	-.207		

Note: All figures except "n" values are expressed in percentage terms. Some data are missing. Table is presented for illustrative purposes only, since the selection of survey participants was not (and could not be) random.

Table 2: Economic Status and Treatment Services - Quality Rating

	Excellent	Very Good	Good	Fair	Total
Very Small	17	47	30	7	100
Small	12	53	28	7	100
Medium	23	51	21	4	100
Large	42	58	0	0	100
Total	23	52	20	5	100

	Value	DF	PROB
Test Statistic			
Pearson Chi-Square	20.489	9	0.015
Likelihood Ratio Chi-Square	27.721	9	0.001
Coefficient			
Spearman Rho	-.319		

Note: All figures in Table except "n" values are expressed in percentage terms. Some data are missing.

provided in Cameroon and other African countries (eg., caesarean, castration, deworming, bone fracture repairs) are those experienced and trained paraprofessionals should be able to deliver (and are, in fact, delivering). The high level of satisfaction expressed by survey participants in this consultant's study may be attributed to the fact that Cameroon paraveterinarians are quite competent in delivering routine services. If this is so, why then invest in highly trained personnel when lower level ones will do?

The argument being made in this essay is not that African governments have absolutely no need for highly trained veterinarians. Indeed, they do in areas such as diagnosis, epidemiology and animal production. Nor is the argument that highly trained veterinarians have no financial future in the African countryside. On the contrary, under proper service delivery arrangements, this researcher believes that full veterinarians can earn a living from rural practice. There is a strong demand for animal drugs in rural Cameroon, and it may be best if the supply of drugs is in the hands of a veterinarian as opposed to a paraveterinarian, for the former may be more qualified to determine drug quality and train clients on proper usage.

What is being argued, however, is that given the nature of the clinical services being demanded ("routine" as opposed to "complex" ones); the need for services in the rural areas, which is not being met at the moment because of the propensity of full veterinarians to practice in urban areas; the scarcity of financial resources; and the fact that paraprofessionals can be trained more cheaply compared to full veterinarians (more bang for the buck, so to speak), it is more economically rational for African state officials and donors to allocate resources toward the training of veterinary paraprofessionals. At the same time, if some full veterinarians decide to set up shop in the countryside on their own, then so much better!

FUTURE DIRECTIONS

The thrust of the position being taken at this point is two-fold. In the first instance, veterinary manpower planning in Africa can be improved by focusing on paraprofessional training; in the second, the very content of the training will have to be modified so as to prepare future service providers for private practice and the rigours of the marketplace. Until recently, virtually all veterinarians and paraveterinarians were offered state employment almost immediately after completing their training. The result has been that there is no history and culture of private veterinary practice in much of Africa, although unofficially many veterinary providers have been receiving compensation from clients even where their services were to be provided free-of-charge (Leonard, 1987; de Haan, 1992; Gros, 1993).

In the drive toward privatising animal health care delivery in Africa, the curriculum of newly trained personnel will have to include non-animal health courses, such as economics, accounting, and business management and ethics. In this vein, the following curriculum reform is proposed: that no less than one third of the courses taken by an aspiring animal provider, whether he/she be a veterinarian or a paraprofessional, be in the aforementioned fields. Courses in subjects other than veterinary medicine could be taken either upon satisfactory completion of those in the student's main field or in conjunction with them, but not before. Only after demonstrating academic competence in veterinary medicine should the student be trained in how to deliver it as a private practitioner. To this consultant's best knowledge, the recommendation is being followed only in a handful of countries (Cameroon being one of them). The overwhelming focus in veterinary training in Africa even today is on courses that directly relate to medicine. During a recent seminar (July 1993) which the consultant helped to set up at the University of California at Berkeley (USA), few of the African veterinarians had had courses in economics or business management. This situation will have to change if a private system of veterinary care delivery is to take hold on the African continent.

For those providers who have already undergone training and have worked in public sector employment for some time, business courses could be made available by the state as part of the strategy to encourage people to leave the public sector and become private practitioners. Disenchanted veterinary civil servants, even if they want to give private practice a chance, are unlikely to do so if they are not sensitised and trained to withstand the wrath of market forces. The market can be a very unforgiving and intimidating place, especially to those who do not know how it works. Courses in such fields as economics, accounting, management, and even marketing, may help to alleviate some of the fears that African veterinarians have and thus ease the transition to private practice.

As suggested earlier, African countries do have a need for veterinarians in critical areas such as diagnostics, epidemiological research, animal production, and in the delivery of services related to public health (meat inspection in particular). Their participation in these critical areas is clearly preferable to those of paraprofessionals. Being highly trained, full veterinarians can clearly be most effective if their time is devoted to investigating how zoonoses are transmitted and to finding cures to them; to increasing animal production through research in crossbreeding and artificial insemination; and as professionals, veterinarians are more likely to be imbued with a sense of protecting the public against unsafe meat products than their paraprofessional counterparts[1]. Hence, there is also a need for improving capacity building amongst full veterinarians (3). The problem in countries such as Cameroon is that veterinarians who are engaged in research at the major research centres have tended to focus on the modern and intensive systems of livestock raising in Cameroon, at the expense of the traditional system which predominates throughout Africa. It is also true that in much of Africa, small ruminants and poultry have received virtually no attention. The World Bank conceded these problems in a 1988 report on livestock (World Bank, 1988).

Veterinary manpower planning in Africa will need to be reoriented so that full veterinarians pay considerably more attention to traditional cattle farmers, small ruminant producers (many of whom happen to be women), and poultry. The Small Ruminant Collaborative Research Support Program (SR-CRSP) that is financed by the United States Agency for International Development (USAID) and managed by various US universities is an important step forward in improving small ruminant production in countries as diverse as

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[1] Part of what distinguishes a professional from a paraprofessional is the fact that, in addition to greater technical training, the former is trained to feel responsible not only toward clients, but also society and his/her peers. "To serve the public" is a value that is inculcated in most professionals whose work relates directly to the "greater good". The "public service" ethos is a very useful tool that African governments have at their disposal to achieve the highest levels of performance by full veterinarians in critical areas such as meat and abattoir inspection.

Kenya, Indonesia and Bolivia. More veterinarians with interest and expertise in small animal health and production should be valuable assets in improving the small ruminant sector in Africa, where the veterinary profession is very much male-dominated. (There is not to this researcher's knowledge a single female member of the Cameroon Veterinary Association, the only professional veterinary association in that country! This issue is mentioned only in passing in this paper, but it is an important one. Does gender affect the types of skills and expertise available in the animal health care field in Africa?) Greater efforts in encouraging women to become veterinarians might help to shift research focus toward small ruminants and poultry, since in many African countries small stock raising happens to be the purview of women.

ANTICIPATING THE PROBLEMS

A manpower strategy that incorporates paraprofessionals is not problem-free in its implementation, nor is it a panacea. Let us first focus on some of the likely problems to incorporating paraveterinarians in the new delivery system(s) being attempted throughout Africa. In the first instance, planners are likely to be faced with a political problem. It is a fact that in livestock ministries in Africa veterinarians are very well represented. In Cameroon, many of the people who occupy policy-making positions in the ministry are veterinarians; they are likely to resist any attempt that does not give them monopoly rights in the delivery of animal health services. On the other hand, paraprofessionals are not nearly as powerful and organised as full veterinarians. Paraprofessionals are unlikely to speak out against people whom they consider their superiors. Hence, the first problem that needs to be overcome is one of political resistance by a strong professional group determined to protect the interests of its members. Donor agencies, such as FAO-UN, the World Bank, and USAID, have a role to play in supporting the use of paraveterinarians in the new system. Many livestock development projects in Africa are in one way or the other being financed by one of these agencies; they are in a position to use the power of the purse in support of paraveterinarian incorporation.

The inclusion of paraveterinarians has also been assailed by veterinarians because of its alleged unfairness. Cameroon veterinarians point to the fact that they could not compete with veterinary nurses and auxiliaries in a system of unfettered competition because, being less well-trained than they are, the cost of a paraprofessional's service will always be lower than theirs. Therefore, they argue, competition between unequal is also unfair. It is also argued by some Cameroon veterinarians that, having invested in their training, the state would end up as the biggest loser if it allowed valuable skills from being used because of the inability of full veterinarians to compete with their paraprofessional counterparts (interview with Dr Antoine Choubia, adjunct-director of veterinary services in Cameroon, 1991). This argument largely ignores the view that African governments have gained little from the skills of full veterinarians anyway, since they have not participated directly in service delivery.

Nevertheless, there is some validity to the argument. As was remarked earlier, many African farmers do not draw a distinction between full veterinarians and nurses; as a result, it is not unreasonable to assume that they would always opt for whoever provided services at the cheapest cost, something which paraveterinarians might be expected to be able to do. At the same time, a good veterinarian can be expected to provide a greater range of services than a paraveterinarian, no matter how good the latter may be. Hence, even though African farmers are not in a position to differentiate the skill levels of various animal health providers up to a certain point, they are in a position to know that some providers can provide them with a greater range of high-quality services than others[2]. Thus, a full veterinarian can always improve quality at the margin in return for added compensation by African farmers. Services provided by different types of animal health providers do not have to carry similar price tags. Veterinarians may be allowed to charge more, and farmers may be willing to pay more, if they perceive they are getting a greater range of services from the "better" providers. A highly skilled, innovative, and entrepreneurial veterinarian should have nothing to fear from a paraprofessional.

In addition, veterinary graduates may be allowed to advertise their services. Such advertisement may seek to inform farmers about the difference between veterinarians and paraveterinarians without unnecessary mudslinging. Full veterinarians and paraveterinarians could be mandated to wear different types of clothing; to state verbally their status; or otherwise identify themselves before service delivery. The international veterinary logo visibly inscribed on the uniform of veterinarians might be mandated by the state, while paraveterinarians could be asked to wear very different outfits. In that way, farmers would know whether they are being serviced by full doctors, in which case they would be getting more than routine service quality in exchange for higher payment, or by paraveterinarians, in which they would be faced with standard services.

Finally, it ought to be remarked that veterinary paraprofessionals in many African countries are poorly equipped. A manpower strategy that seeks to increase the supply of animal health providers, without improving veterinary input supply, is likely to generate only modest improvements in the quality of services. A veterinarian or a paraveterinarian without instruments or drugs is a useless entity. In the study this consultant conducted in Cameroon in 1991, it was evident that veterinary field officers lack even the most basic instruments and inputs (i.e., drugs).

Table 3 shows that only 16% of the adjunct-nurses and agents (defined in the study as "auxiliaries") had their own stethoscope compared to 100% of the veterinarians, and only 21% owned surgical tools compared to 83% of the veterinarians.

Veterinary field officials in Cameroon appeared to be better equipped in thermometers, syringes and needles. Seventy four percent of the adjunct veterinary nurses and agents reported owning a thermometer and 58% had their own syringes and needles. There appeared to be little, if any, lab work going on in the field as evidenced by the widespread shortage of microscopes and other equipment. Epizootic diagnosis in Cameroon is based on visual diagnosis and symptom description provided by livestock owners. These are problems which even the most comprehensive manpower planning strategy is not likely to solve immediately.

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[2] The argument being made here is a subtle but important one. A paraveterinarian may be quite good at delivering routine services; and a layperson such as a farmer may be unable to detect quality differences between routine services provided by a paraveterinarian and a full veterinarian. However, like human medicine, the practice of veterinary medicine requires great foresight by the practitioner. A full veterinarian may be able to go beyond the call of duty to pinpoint additional health problems to the farmer, while a paraveterinarian may not be able to do likewise. The ability of full veterinarians to improve services at the margin gives them a significant advantage over paraveterinarians, which they can use to better position themselves in the marketplace.

Given widespread scarcity of some of the most basic veterinary instruments, it is a legitimate question to ask whether field staff, especially auxiliaries, are in fact prepared to make the transition to the private sector. My own conclusion is that they are not. Doctors in the study appeared to have the necessary instruments, but, as was pointed out earlier, their job is essentially administrative. Hence, the delivery of animal health services in Cameroon faces a peculiar paradox: those who are most qualified and most equipped to deliver services are not the ones delivering them. For any manpower strategy to make a difference in service quality, a solution to the problem of inadequate inputs supply will have to be found. Farmers are unlikely to have faith in the new system if providers are as ill-equipped in providing services as they are. Again, an ill-equipped animal health provider, without even the most basic instruments and drugs, has little chance of earning a living as a private practitioner. The problem does not end with lack of inputs, however. The lack of reliable means of transport is another major problem, as Table 4 shows.

According to Table 4, only 37% (17) of those polled rated their means of transport as "reliable." The rest (63%) rated them as either "somewhat reliable" or "unreliable," meaning that staff members could not frequently move when they needed to because they did not have transport at all, or because of mechanical and fuel problems with the vehicle they had. Transport is probably going to be the most significant investment for anyone contemplating private practice, especially in rural areas. Judging by the responses of those sampled, as well as by the consultant's own observation, it is clear that at the moment field staff do not have the capacity to set up the type of mobile delivery system that may be necessary for effective service delivery.

Another important obstacle, one which has been mentioned only in passing thus far, is the inadequacy of input supplies (i.e., drugs). Table 5 shows how severe the problem of drug shortage is perceived to be by veterinary officials.

Table 6 indicates that 87% of survey respondents rated drug supply as "inadequate." Veterinary doctors tended to be more critical on this subject than their subordinates. All of the veterinary doctors who responded to the question said that drug supply was "inadequate." The lack of veterinary drugs within the auspices of the state-owned agency responsible for animal drug distribution (or OPV in its French acronym) appeared to be so serious that it is one area in which livestock owners and veterinary staff appear to be in basic agreement. A strong manpower planning will make little difference in service quality unless there are improvements in this area. The availability of veterinary drugs on the parallel market may be a direct consequence of the failure of the existing system of drug import and distribution.

The lesson is worth repeating. No matter the wisdom embedded in a manpower strategy that advocates the use of paraprofessionals in the delivery of private of quasi-private veterinary services, there would still be outstanding problems. Adequate manpower planning cannot in and of itself solve the problems that have just been outlined. Hence, any solution envisaged has got to be comprehensive and global in its orientation, if it is to make a

Table 3: Veterinary Staff and Instrument Ownership

	Stethoscope	Thermometer	Syringes/Needles	Surgical
Doctors	100	100	75	83
Nurses	56	78	44	39
Auxiliaries	16	74	58	21

Note: All figures are expressed in percentage terms

Table 4: Veterinary Staff and Transport Reliability

	Reliable	Somewhat Reliable	Unreliable	Total
Doctors	42	50	8	100
Nurses	32	32	37	100
Auxiliaries	40	27	33	100
Total	37	35	28	100

	Value	DF	PROB
Test Statistic			
Pearson Chi-Square	3.715	4	0.446
Likelihood Ratio Chi-Square	4.253	4	0.373

Note: Auxiliaries are all veterinary staff members below nurses. All figures in Table except "n" values are expressed in percentage terms. Transport means include both private transport means (cars, scooters, bicycles, etc.) as well as those owned by the ministry. Some data are missing.

difference in improving, not only the supply of animal health providers, but also the quality of the services they deliver.

FARMER TRAINING

In addition to paraprofessional inclusion, it is highly desirable that veterinary health planners broaden the scope of manpower improvement strategies to include farmer self-treatment. This is an area that has been sorely neglected by African countries; yet, as this consultant's study confirms and as widely acknowledged by livestock ministry officials in

Table 5: Veterinary Staff and Ranking of Drug Supply

	Adequate	Somewhat Adequate	Inadequate	Total
Doctors	0	0	100	100
Nurses	6	6	88	100
Auxiliaries	0	21	79	100
Total	2	11	87	100

	Value	DF	PROB
Test Statistic			
Pearson Chi-Square	5.590	4	0.232
Likelihood Ratio Chi-Square	6.662	4	0.155
Coefficient			
Spearman Rho	-.233		

Note: Auxiliaries are all veterinary staff members below nurses. All figures except "n" values are expressed in percentage terms. Some data are missing.

Table 6: Disease and Owner Treatment Effectiveness as Measured by Outcome

	Animal Got Better	No Change	Animal Got Worse	Total
Blood Parasitic	96	4	0	100
Viral/Bacterial Diseases	4	75	21	100
Minor Surgery	100	0	0	100
Deworming	100	0	0	100
Total	78	17	4	100

Note: All figures except "n" values are expressed in percentage terms. Some data are missing.

Cameroon, farmers already provide a good deal of the animal health services needed by their animals. It is ultimately counter-productive for animal health planners to continue to ignore the role that farmers are already playing in the delivery of veterinary services. A recognition by animal health planners of the extent of farmer involvement in the animal health systems in Africa is a first step; training them to do an even better job at what they do would be the next. Over 77% of the farmers interviewed in the study reported having provided some form of treatment to their animals sometime in the three months preceding the interview; forty one percent admitted having vaccinated their flock during the same period of time, something that is supposed to be provided by veterinary state officials only.

Large unit farmers were more likely to engage in vaccinating their animals than small or medium ones. This was a surprising result in view of the low per unit cost of the vaccines (15 US cents), the high level of satisfaction that farmers reported with government services, and the fact that vaccines in Cameroon require cold-chain equipment (i.e., refrigerators and ice boxes) to maintain potency and syringes for administration. Some of the farmers interviewed did have the necessary equipment, but many did not. The high percentage of farmers who were engaged in the vaccination of their animals and the even higher percentage providing treatment to their animals suggests that African farmers will not wait for "professional" services even if they are "satisfied" with them. Farmers will indeed take matters into their own hands if the inputs and instruments are available.

How effective are Cameroon farmers in providing treatment to their animals? Table 6 helps to answer that question. Cameroon livestock producers appear to be quite effective at treating certain illness; they seem to be successful in treating cases of trypanosomiasis, internal parasites, and in performing basic surgery, such as repairing bone fracture and castration. These procedures, incidentally, are precisely the ones that are carried out by paraveterinarians. Here there is a potential conflict of interest between the incorporation of paraveterinarians and farmers in improving manpower, for if farmers are effective in treating the same illness that paraveterinarians treat, why should they be expected to turn to the latter for service?

On the other hand, no matter their effectiveness, it is reasonable to assume that livestock farmers are likely to have some demand for veterinary services, especially those they cannot provide themselves. (Farmers will certainly have a demand for modern drugs which they do not manufacture.) However, it is unlikely they would altogether forego treating their own animals, especially if the costs (in terms of money and time) of receiving services from paraprofessionals are deemed too high. (It should also be apparent that training farmers to provide basic veterinary services has the added advantage of ensuring that services provided by paraveterinarians are reasonably priced.)

Perhaps more importantly, African farmers will continue to be actively engaged in the delivery of veterinary services because of what might be called, for want of a better term, the ecology of livestock raising in much of Africa. Farmers go on transhumance for a good portion of the year; during that time they have no access to veterinary personnel, as flocks may be hundreds of kilometres away from the nearest post. The pattern of service utilisation seems to be that farmers use veterinary services when they are available, but they or their herders provide services when veterinary staff are unavailable.

Farmer participation in the delivery of animal health services is a reality (and a permanent one at that). African veterinary health planners ignore this reality at their own peril. There are many facets of this issue that ought to play centre stage as planners grapple with ways to improve the supply of animal health providers and the quality of the services they provide: what are the costs and benefits of training paraprofessionals versus farmers, or vice versa; are there irreconcilable conflicts of interests in incorporating the two groups in the new delivery system; and finally, what impacts will the inclusion of paraveterinarians and farmers have on highly trained personnel such as full veterinarians?

ANTICIPATING THE PROBLEMS AGAIN

As a matter of general strategy, this consultant strongly supports the incorporation of farmer self-treatment in the delivery system (although there may be problems of implementation, not the least of which is potential resistance from paraveterinarians and perhaps even full veterinarians, and probably some health consequences). The raison d'être of the position taken in this essay is based on the utility of having farmers administering their own treatment and on the near impossibility of preventing them from doing so. The former point has been covered at some length, let us focus on the latter.

A ban on producer self-treatment would be very difficult to implement principally because of high enforcement and information costs and what might be called, for want of a better term, the "ecology" of livestock raising in much of Sub-Saharan Africa. Banning producer self-treatment would have to involve banning related activities such as direct drug sales to producers, closing the parallel market which would, in turn, involve tighter border control and punishing violators through fines, prison terms, etc. A ban on producer self-treatment would also involve policing farms and range lands to collect information about transgressors. Moreover, because mainly traditional livestock producers in Africa go on transhumance for an extended period of the year, some mechanism would have to be found to ensure that they respect the law, but, equally important, that they have access to services during this period (Boutrais, 1983). In sum, the transaction costs of enforcing a ban on producer self treatment might be so high that, in the end, they might very well exceed the benefits.

Another approach would be to ignore producer self-treatment in the hope that once fully in place, the new system would work so well that producers would be eventually convinced that getting "professional" service is the better alternative. While this might be the least costly approach, it provides virtually zero guarantee that the desired outcome would ensue. In fact, there is strong reason to believe that producers are not likely to forego self-treatment (and self-vaccination) altogether as long as there are costs to using private providers; as long as inputs such as drugs are widely available on the parallel market; and as long as producers believe they are effective in treating at least some diseases.

The recommended strategy is for producer self-treatment (but not self-vaccination) to be made an integral part of the delivery system. This would involve an acknowledgment by policy makers of the importance of producer participation in the delivery of veterinary services and the need to assist them to do a better job. Hence, producer training would be an important component of the strategy. The content of training might be limited to those treatment services which producers are already providing haphazardly (trypanosomiasis treatment, deworming, etc.), as well as teaching them to identify fraudulent drugs and to use the good ones properly. Producer training ought not to be extended to preventive care (i.e., vaccination) because small producers in particular are likely to lack the cold-chain equipment (i.e., refrigerators, ice boxes) necessary to preserve the vaccines. Moreover, vaccinations provided on a contract basis are likely to be a major source of income for private practitioners; therefore its delivery by producers would pose a greater financial threat to the viability of private practice than treatment services.

Official producer participation in the delivery system is not without costs, the most obvious of which is that it could undermine the financial viability of private practice especially by paraprofessionals. Having received less training than full professionals, paraprofessionals are likely to be most useful in providing the very services that producers would be trained to provide for themselves. As a result, paraprofessionals would be in direct competition with producers for the delivery of those services. In so far as it already exists, this outcome is probably unavoidable. It should be remarked, however, that the primary sources of income for any private provider, except perhaps in the more intensive and modern livestock raising systems in Africa, are likely to be drug sales and government contracts - not fees for curative veterinary services. Hence the costs of incorporating producer self-treatment into the new delivery system may not be as high as one would think; certainly they would not have as major an impact on veterinarians as they would on paraveterinarians.

A policy that discourages farmer vaccination might be effective for the following reasons. Because fewer farmers are apparently engaged in vaccination compared to treatment, it might be easier to convince them not to engage in the practice. Vaccination services take place only once or twice a year (usually in between seasons) whereas those pertaining to treatment exist all year long; this should make enforcement somewhat easier. Proper vaccine administration requires at a minimum some producer investment in storage facilities (eg., ice boxes) and instruments (eg., syringes), whereas if vaccines are administered by "professionals" these sunk assets are already included in services cost, which at the moment amount to a cost per unit of only 15 US cents in countries such as Cameroon. It might be more cost effective for producers not to vaccinate, and that should be conveyed to them. Finally, the effects of failed vaccines are infinitely greater than those of failed treatment (simply because the death of one animal is not nearly as financially ruinous as that of an entire flock); worse, producers have no recourse if vaccines administered by them fail; they may have a legitimate claim for compensation if there is a similar outcome from vaccines provided by private veterinarians sanctioned by the state (the same is, of course, true of self-treatment). In sum, there are strong arguments against self-vaccination, which, if conveyed strongly to farmers, might help deter them from practising it.

The example set by the Central African Republic (CAR) could be a good one for the rest of Africa. There, livestock farmers, organised into one giant cooperative FENEC, are trained to provide curative and preventive care against basic animal diseases such as trypanosomiasis.[3] The more difficult cases, drug sales, and vaccination services could be left to veterinarians and nurses. However, given that many of the major infections are not treated, there are severe limits to the earnings of private providers from diagnostic and treatment services, which makes private delivery of "public good" services on a contracting basis even more necessary. If veterinary practice is to be profitable, it is paramount that the range of curative services be expanded. This means that providers will need to have, amongst other things, the laboratory equipment to diagnose viral and bacterial diseases. New drugs will need to be found to treat at least some of the diseases.

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[3] FENEC, or Fédération Nationale des Eleveurs Centrafricains, is the largest livestock producer cooperative in the Central African Republic.

Again, the main disadvantage or cost of a strategy that embraces farmer treatment is that low level veterinary staff (i.e., adjunct-nurses) would most likely be the prime casualties. Being less trained, all they can provide are the most basic types of care which farmers are already providing. Some low level positions could be eliminated through attrition and retirement. Paraveterinarians (especially full nurses) who are willing and able to return to school could acquire more training, which would allow them to perform more complex tasks as private practitioners. In some ways, this is already taking place in places such as Cameroon, where in 1991 at the national veterinary training centres of Jakiri (Anglophone Cameroon) and Maroua (Francophone Cameroon) a small number of students were being trained specifically for the private sector. To this consultant's best knowledge, expenses were paid either by the students themselves or by sponsoring organizations.[4] These centres could be used to increase the skills of those who are not qualified to care beyond the most basic. At the same time, the state would help in the training of farmers through its extension agents. In this vein, Benor's training and visit system, which has been used primarily in agriculture proper, might also be used, with some modification and the consent of local officials, in livestock.[5]

CONCLUSION

Some of the recommendations in this position paper are, without doubt, controversial. In Cameroon, where the recommendations were first made, livestock policy makers (many of whom are professional veterinarians) have been reluctant to implement them. This is due in large part to the fact that what is being proposed will result in turning animal health care delivery on its head. Rather than continuing to devote scarce resources to the training of full veterinarians, this paper proposes that paraveterinarians and farmers themselves be at the centre of any strategy that seeks to increase veterinary manpower in Africa. Full veterinarians have been a privileged class in the post-colonial period; they have not had to directly deliver services in much of Africa; the people who typically provide services are paraveterinarians, when they can reach farmers, and farmers themselves. Given this reality, rational use of scarce resources would seem to entail helping those who are already on the front-line.

Clearly, allowing both paraveterinarians and farmers to be full actors in the new delivery system is not without contradiction. Indeed, there would appear to be a direct conflict of interest between a paraveterinarian's ability to earn a living from private practice and farmer training. Manpower policy planners will have to decide whether this contradiction is inevitable, and, if so, what are the relative benefits and costs of making one policy choice over the other.

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[4] Interview with Dr. Thys, former training director, MINEPIA-DEPF, May, 1991.

[5] It is worth pointing out that the World Bank's attempt to use training and visit system approach in livestock has been vigorously resisted by Cameroon livestock policy makers, on the ground that livestock raising is very different from agriculture. The Third Livestock Development Project in Cameroon has come to a virtual halt because of disagreements over this issue.

Full veterinarians do have a critical role to play in the evolving animal health care system(s) in Africa; they are particularly well-suited to diagnose and combat animal diseases and to improve the genetic makeup of local breeds. In addition to research, veterinarians may be expected to have the heavy responsibility of protecting the public against contaminated animal products. Meat and abattoir inspection should be the domains of full veterinarians. Relatedly, full veterinarians might be given preference (but no monopoly rights) in the delivery of vaccination services on a contract basis. Finally, no other group is more technically qualified to train paraprofessionals and farmers than full veterinarians; hence the "new" African veterinarian is also expected to be a teacher.

Many of the functions mentioned in the last paragraph can be accomplished without a dramatic increase in the current supply of full veterinarians in many African countries; to the extent that any increase is needed, it should be incremental and done only upon careful investigation of the relative utility of investing in full veterinarians rather than other groups. The thrust of the strategy to increase manpower in the area of direct service delivery should be on paraprofessionals and farmers themselves.

ABOUT THE RESEARCH DESIGN

As noted earlier, much of the empirical evidence presented in this paper is based on a study of livestock services reforms conducted by the consultant in 1991. Considerable problems were encountered in structuring the research design for the study. In the end, because of a variety of problems, including political turmoil in Cameroon which prevented the research team from moving about freely, random selection of survey participants (livestock farmers in particular) was not possible. The reader is thus cautioned from reading too much into the results presented; they are meant for illustrative purposes and to provoke discussion.

Perhaps the most problematic issues the consultant had to face was how to classify the participants. There was a strong interest in finding out how cost recovery was affecting the poor, but the challenge was how to determine who was "poor," or, as they are classified in the Tables, who were the "very small" producers? The simplest and quickest way would have been to ask participants how many cattle head they owned, or to ask them about their annual income. These pieces of information (especially the former) are held as sacrosanct in most pastoral societies; the consultant did not want to probe directly into issues of herd size and earnings for fear that participants would be unwilling and/or unable to tell the truth. In any event, asking direct questions about wealth endowments was pre-empted by the fact that, in order to gain the participant's trust, the consultant had pledged at the beginning of each interview not to ask participant's questions about the size of their herd. In addition, many of the interviews took place at or near village headquarters. The consultant and his assistants did not have the opportunity to go inside the participants' homes and, therefore, could not gauge their wealth based on their lifestyle. Some other ways, however subjective and imperfect, which would allow for educated guesses about the economic endowments of each participant had to be found! The indices that were used to make this decision included the number of herders working for the participants and the total amount of money they spent on animals during the last vaccination campaign (1990).

The participants were classified as follows. A "very small" livestock owner was someone who had either 1 or 0 herders and spent 2,000 CFA Francs or less on vaccination services. A "small" livestock owner was someone who had 2 or 3 herders and spent between 2,001 and 10,000 CFA Francs on vaccination services. A "medium" livestock owner was someone who had either 4 or 5 herders and spent between 10,001 and 50,000 CFA Francs on vaccination services. In this category there was one participant who had the "right" number of herders (4 to be precise), but spent 10,000 CFA Francs. Because that participant was so close to the lower end of the expenditure range, it was felt that it would be reasonable to put him in the "medium" category, even though he did not exactly meet the two criteria necessary. Lastly, a "large" livestock owner was someone who had more than 5 herders and spent more than 50,000 CFA Francs on vaccination services. Again, there were 3 survey participants who met the employment criterion, but "failed" the expenditure criterion by reporting having spent between 40,000 and 50,000 CFA Francs. These survey participants were put in the "large" category.

In essence, more weight was given to the employment index in all four of the atypical cases because the consultant felt that the participants were close enough to the chosen expenditure range to warrant pulling them upward. Part of the reason for giving somewhat less weight to the expenditure index was also based on the view that in an era of declining epizootic threats and declining cattle prices, people were likely to adopt a laissez-faire attitude toward vaccination services, thereby causing them to spend less than they otherwise would. Because of these factors, the consultant felt that vaccination expenditures were not as indicative of herd size as the number of herders employed, since no matter the circumstances, livestock owners always need people to look after their herd(s).

END NOTES

The paper focuses on two groups of animal health providers: full veterinarians (or doctors) and paraprofessionals. Veterinary paraprofessionals involve a very broad sub-group of animal health providers, such as veterinary nurses, adjunct-nurses (or nurse's aid) and veterinary agents. Veterinary nurses are themselves divided in Cameroon into veterinary nurses proper and principal veterinary nurses. Although no explicit distinction is made amongst the paraprofessional groups in the paper, it is not the view of this consultant that participation in the new system(s) of veterinary care delivery should be fully extended to all paraprofessionals. Instead, this consultant is of the view that veterinary nurses, whether they be nurses proper or "principal/advanced nurses", should be included in the new system(s). As for adjunct-nurses and agents, the paper does not necessarily endorse their inclusion, nor does it advocate their complete exclusion. The wisdom of a strategy that advocates the inclusion of lower level paraprofessionals depends on whether they operate under the supervision of more qualified personnel or as independent practitioners, which this consultant does not support. Moreover, throughout the essay the consultant uses livestock producers, farmers and agro-pastoralists interchangeably. In all cases, reference is being made to people whose livelihood is derived primarily from livestock raising, cattle in particular. Finally, the privatisation of livestock services (animal health in particular) in Cameroon is part of a larger effort to restructure the livestock sub-sector in that country. More specifically, the Third Livestock Development Project, which is being financed largely by the World Bank and the EEC, seeks to encourage government veterinarians to leave public services and become private practitioners.

This consultant conducted a study on veterinary care reforms in Cameroon in 1991. The study was aimed at assessing, amongst other things, the impact of cost recovery on producer demand for veterinary services, and how veterinary personnel felt about impending reforms. Six cattle markets were visited in Adamaoua province, the largest cattle producing region in Cameroon; and 1 market in Northwest province, the third or fourth largest cattle producing region, depending on the year. In addition, interviews were also conducted in various villages. Although the sample size was small and the selection of participants was largely non-random, the results of the study raise important questions about how some farmers have responded to cost recovery efforts, and how they are likely to respond to a privatised system of livestock services delivery. Because the survey questions evaluate changes in respondent behaviour, they provide strong evidence of the direction of effects, even if the exact magnitudes remain uncertain. The decision to present the results in this paper is meant to (a) provide an illustration of the kinds of issues that policy makers should think about as they prepare to radically change livestock services delivery and financing on the African continent, and, more importantly for this paper, to (b) draw attention to the need for incorporating paraprofessionals and farmers in manpower planning in Africa.

Greater efforts are needed in strengthening professional veterinary associations in Africa. The importance of this strategy lies in the fact that, like all professionals, veterinarians draw strength and inspiration from their peers. Stronger veterinary associations, with the power to sanction and reward veterinarians, could go a long way in ensuring the delivery of high-quality service. Given current economic conditions throughout Africa, it is probably unrealistic to expect governments to devote scarce resources to professional associations. This is one area in which the assistance of international professional associations to local ones could be very valuable.

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J.T.Blackburn - *Resolutions of Previous Expert Consultations*

INTRODUCTION

Some previous recommendations relative to veterinary manpower needs listed in Chapter 10 are expanded in this paper. Comments made here are the opinions of the author based on personal experience, discussions with a variety of colleagues and the scanning of various reports over a number of years. It is not the intention to prepare a definitive report on the impact of previous recommendations but rather to put forward personal impressions and ideas with the intention of stimulating some discussion. It is assumed for the purposes of this discussion that we are considering primarily animals of economic importance, i.e., production of food, draught power etc., and not companion animals.

MANPOWER NEEDS

It would be specious to point out that planning of veterinary manpower needs is very difficult and unreliable. Planning of manpower needs based on the number of livestock units (LSU) sounds reasonable but there is a sting in the tail of this recommendation - "and a variety of other factors"! It is submitted that the "other factors" are probably the most important part of this recommendation and will be referred to later.

The use of LSU allows comparison between various countries and can help to highlight the influence of different systems of husbandry, but it requires careful application when trying to indicate the number of veterinarians required per X thousand LSU. The impression is sometimes given that the veterinary situation in some of the developed countries is considered the ideal, whereas comparison may be inappropriate for a variety of reasons including economic ones and the fact that companion animals form an important (and profitable) part of a veterinarian's work in a developed country.

It is interesting to note that developed countries, with all their resources and background of veterinary activities, also have problems when planning veterinary manpower needs and although the author does not favour using developed countries as an example of what can or should be done, the following examples are introduced at this stage because reference will be made later to the importance of strong national veterinary associations.

Two examples in recent years are the United Kingdom and Australia. In the late 1970s the Australian Veterinary Association commissioned a report on veterinary manpower requirements. Projections indicated that there was over production and that training of veterinarians should be cut back. Ten years later there was a veterinary shortfall.

The British Veterinary Association triggered off the same sequence of events in the 1980s and when trying to reverse the consequences almost lost two of its six veterinary schools. The mistakes made in both cases included failure to appreciate public recognition of veterinary skills in related areas, increasing growth of small animal practice, increasing involvement in public health, comparative medicine and the environment, tighter controls in international trade, public interest in animal welfare and ethical matters and the increasing number of females in the profession. However, in each case the Associations were powerful enough to influence the respective governments to rectify matters.

Whether or not recommendations based on LSU have had much impact on developing countries is difficult to assess; the overall impression is that they have had little impact, "other factors" probably having a greater influence on the situation. However, use of LSU enables comparisons to be made between countries. (Table 1) Egypt and Ethiopia have been included to demonstrate extreme and opposite situations; Botswana and Swaziland as examples of countries with relatively small human populations. How can Egypt afford to employ that number of veterinarians? Ethiopia needs more staff, but can barely afford to pay the veterinarians already employed. Can countries with small human populations "spare" sufficient people to be trained in one general field?

When trying to calculate the actual numbers of professional staff required some of the "other factors" should be brought into the calculation, including human population, GNP, total value of the livestock industries etc. - something for the statisticians and mathematicians to play with and produce some form of model.

One particular recommendation refers to planning at the national or regional level. The present state of the economies of some developing countries would indicate that regional planning would make sense but who is to decide which countries should cooperate as a region?

SOCIO-ECONOMIC FACTORS

Although socio-economic factors are an important part of livestock development programs, particularly in developing countries with large cattle populations, veterinary input is variable and one still hears of antagonism between agricultural and veterinary departments. No matter what plans are made, it is essential to be able to interest and influence politicians. Veterinarians *per se*, tend not to be political animals and do not sell themselves very well, perhaps because they tend to have a high opinion of the profession and expect others to respect their knowledge.

It is in the context of development of national programs that strong national veterinary associations are important. This means far more than forming an association for meeting and exchanging information with colleagues, important though that is; an association should also have credibility at national level and command sufficient respect to be invited by the appropriate government department to give its views on all animal health and production matters.

VETERINARY MANPOWER NEEDS - TEN YEAR PLANS

The difficulty in making projection plans has already been mentioned. When speaking of the "needs" of a developing country, who is to decide their needs? The question of cost does not appear in any of these recommendations. Should we be considering what are their affordable needs i.e. what levels can be sustained by the livestock industry? The fact that no matter what advice is given, the result becomes a political issue, should not be a deterrent to giving advice which is appropriate and capable of being implemented.

One recommendation speaks of numbers, structure and qualifications. There appears to be a tendency to think primarily of professional veterinarians when speaking of manpower needs, which in some countries results in a top heavy service. Perhaps there has been too much emphasis on training veterinarians and not enough emphasis on training support or auxiliary staff. The net result, in many cases, appears to be a veterinary staff whose salaries take up so much of the budget that there is no money for travel and such veterinary work as is done by the auxiliary staff who are in the villages. This aspect is covered by other speakers, but it would appear that a reappraisal of the whole situation is overdue.

LOCATION OF VETERINARY TEACHING INSTITUTIONS

When considering the present situation in many European countries and elsewhere, it is difficult to see evidence of much planning at all. Are all the veterinary schools required? Is the course always appropriate to the country?

The location of veterinary schools appears to be a matter of local or national prestige and therefore a political matter. Some countries are able to produce veterinarians in excess of requirements and cannot afford to employ them. Some form of accreditation system for veterinary schools may help to rationalise the situation and this will no doubt be raised by others present at this meeting. If it is possible to formulate some sort of mathematical model as mentioned at the end of the penultimate paragraph in the first section, this may help national planning.

EDUCATION CO-ORDINATED WITH ALL ASPECTS OF VETERINARY WORK

There is little evidence of this having taken place. In some countries there is now a rush to train people to set up private practice where this has not been previously planned. Similarly there appears to be little evidence of co-ordination in other fields. Converting government veterinarians into private practitioners may sound like an ideal solution but there is no tradition of private practice in many areas of Africa, Asia and now unfortunately in parts of Eastern Europe also.

The foundations of the veterinary profession in developed countries were laid over 200 years ago and were consumer initiated, eg. there was a demand for the services of someone who could treat animals. Concern about epizootics and the resultant setting up of government departments to deal with this came much later (about 100 years ago). Developing countries started with government departments giving free disease control and treatment. In effect, it is now considered necessary to not only train animal health staff to manage a business, but also to educate the animal owner to appreciate the value of a service for which he has to pay. Developments on this last point will be interesting to observe because many farmers will already be far better business men than the veterinarian, because they have always lived in a commercial world and may welcome a service for which they have to pay if a commercial advantage can be demonstrated. The veterinarian may be in a difficult position; he may have to compete with a trained auxiliary, who presumably will charge less for his services.

CONCLUSION

An overall conclusion is that most of the previous recommendations have had little impact primarily due to political and economic factors.

Table 1: Animal Population (in thousands) and Human Population (in millions)

Species	Egypt	Ethiopia	Botswana	Swaziland
Cattle	3,500	30,000	2,500	750
Dairy Cattle	1,400	3,560	300	155
Buffaloes	2,550			
Horses	10	2,700	34	2
Mules	2,001	5,710	156	14
Camels	200	1,060		
Sheep	4,900	23,000	320	35
Goats	4,500	18,000	2,090	320
Pigs	110	20	16	24
Chickens	35,000	58,000	2,100	1,220
Other Poultry	25,260			
LSU* x 1000	10,531	47,232	3,236	960
Veterinarians	22,400	389	39	20
LSU/Veterinarian	470	122,000	83,000	48,000
Human	53	50	1	0.7

Source: FAO Animal Health Yearbook 1991.

* Based on a simplified Table of one unit per bovine, camel, equine, 0.2 unit per pig, 0.1 unit per sheep and goat and 0.001 unit per poultry.

6. PRIVATISATION OF VETERINARY SERVICES

Peter Msolla - *Privatisation of Veterinary Services in Africa*

INTRODUCTION

We live in a changing world, one that has been changing over the years and shall certainly continue to change. The recent socio-economic and political changes in Eastern Europe typified by the collapse of the Berlin Wall and an eventual unification of the two German territories, the end of the cold war between the super-powers, the release of Nelson Mandela in South Africa etc. are all a testimony of a changing world.

It is worth remembering that "the key to any successful business is to focus on customer service"; since every profession exists to service specific needs of the customer, this applies well to veterinary practice. These recent socio-economic and political changes will obviously have an impact on the performance of many professions. Professions will therefore be expected to respond to these changing needs at more or less the speed at which they are occurring. In most cases it will involve efficient technological advances for improved productivity in all sectors of the economies and the service delivery systems.

As we enter into the 21st Century with an unabated demographic explosion particularly in the Third World Countries, coupled with the inability of our environment to support its human biomass, the agricultural and livestock sectors, among many others, will increasingly become under pressure to deliver the much needed services.

FORCES OF CHANGE TOWARDS PRIVATISATION OF VETERINARY SERVICES

A number of factors have been instrumental in the move towards privatisation of veterinary services in Africa. However, the most salient of these factors have been the following:

> The economic crisis of the 1980s exacerbated by drought, floods and famine forced many African governments to adopt different strategies for development as well as changes in government policies. As a result in 1985 the Organization of African Unity (OAU) adopted "Africa's Priority Program for Economic Recovery, 1986-1990". The program recognised the need to establish a more pragmatic balance between public intervention and private initiatives. This is the beginning of privatisation in general including private veterinary practice.
>
> The strong influence of the donor community and in particular the World Bank, the International Monetary Fund and the European Economic Community played a key role towards privatisation. However, of special significance has been the International

Monetary Fund prescription to Third World countries for structural adjustment Programs. As a result, other traditional donor countries also insisted on embarking on such programs as a condition for further funding.

The socio-economic and political changes sweeping across Eastern Europe with adoption of free trade being one factor. This "free market policy" has triggered commercialisation in different sectors of the economy including animal production especially in the peri-urban and high potential areas. This has resulted in producers receiving better prices for their products. The producers are therefore willing to pay full costs for the veterinary services and other inputs rendered to them.

Veterinary services rendered by governments have in some cases been unsatisfactory. The frequent shortage of drugs/chemicals, biologicals, transport, equipment etc. has been the major cause of frustration not only to the peasants/farmers but to the professional staff as well. This factor is also compounded by the proliferation of veterinary faculties on the continent with an average output of 1,200 graduates a year. Most of the graduates, including the technicians (livestock field officers) are unable to be absorbed by the public sector due to budgetary constraints. There is also an imbalance in budgets whereby staff costs are higher than operational costs; as such you have staff who are paid salaries for doing nothing since they do not possess the means to work. This particular development has stirred up considerable interest in private veterinary practice. The financial support packages by the European Development Fund - Pan African Rinderpest Campaign (EDF-PARC), German Agency for Technical Cooperation (GTZ), Aid and Cooperation Fund of France (FAC), the World Bank and other donors have further enhanced this interest.

POLICY ON PRIVATISATION OF VETERINARY SERVICES

Although the introduction of private veterinary practice is a novel idea in some countries, it has not taken long before being accepted by government peers. A number of meetings/workshops of directors of veterinary services (Bujumbura and Blantyre 1984, Berlin 1985 and Bangui 1987) were held to discuss privatisation of veterinary services, cost recovery, liberalisation of drug importation and distribution, among others; it was not until 1987 when the ministers responsible for livestock development in Addis Adaba under the umbrella of OAU/IBAR (Inter-African Bureau for Animal Resources) that a policy on privatisation of veterinary services and cost recovery was accepted. It was also recommended that government subsidies to veterinary services be removed while the monitoring of proper usage of pharmaceuticals, vaccines and chemicals to avoid their misuse and hence drug resistance be reinforced. The liberalisation of animal products was also accepted.

These policies have now been accepted by many member states. However, it is imperative to enact the necessary legislation (eg. for cost recovery) to safeguard the newly introduced policies.

THE ROLE OF PRIVATE VETERINARY PRACTICE

Private veterinary practice is a direct relationship between the livestock owners who are willing to pay for the services and the practitioner. The primary activities of a private practitioner include curative and preventive treatment of animals, surgical intervention, vaccinations, drug dispensing, artificial insemination as well as giving advice to livestock owners. The potential areas for private veterinary practice include the urban (mostly pet animals), peri-urban and high potential areas where dairy, pig and poultry industry is flourishing. Importation of veterinary drugs and distribution may also be privatised.

However, certain responsibilities will have to be retained by the state veterinarian including food/meat inspection, quarantine imposition, compulsory vaccination and disease eradication schemes although some of these may indeed be subcontracted and should be carried out with utmost integrity so as not to jeopardise their aims.

In the extensive livestock areas, the use of paraveterinarians should be encouraged as long as they are well trained, equipped with the necessary skills and closely supervised. Much of the professional work in these areas is usually simple ranging from treatment of common disease conditions to vaccinations. This being the case, the Veterinary Surgeons Ordinance in a number of anglophone countries would have to change to accommodate this aspect.

CATEGORIES OF PRIVATE VETERINARY PRACTICE

Apart from running a traditional veterinary clinic providing curative and preventive services, vaccinations, artificial insemination etc. to the general public and livestock owners, a self-employed veterinarian on the basis of his training and experience may undertake the following:

> Be sub-contracted by the state to perform certain duties, eg. compulsory mass vaccinations viz. rinderpest, CBPP etc. or work on specific disease eradication schemes.
>
> Be engaged by farmer cooperatives, associations, elite farmers, private entrepreneurs (eg. pharmaceutical companies), local banks on a consultancy or full time basis.
>
> Be engaged in direct production activities eg. dairy, ranching, pig/poultry keeping, processing of animal products, compounding of animal feeds as well as fodder production.
>
> Be engaged by international organizations on a consultancy basis.
>
> Be engaged in the importation and distribution of pharmaceuticals and other inputs for the livestock sector. This is well established in Morocco.

Paraveterinarians may work together with veterinarians or alone as long as they are closely supervised.

FINANCING PRIVATE VETERINARY PRACTICE

With policy reforms pertaining to animal productivity having been accepted, several donors interested in developing the livestock sector have come up with financial support packages for the scheme. These reforms are meant to stimulate growth of the livestock sector in order to meet the nutritional requirements of a rapidly growing human population. The growth rate of the Sub-Saharan African population is roughly 3.1% while meat and milk lag behind at 1.4% and 2.3% respectively. While there are many factors to enhance animal productivity, strengthening the delivery of animal health care services and removing undue government subsidies is one of the key factors. The principal donors to this scheme have been the African Development Bank (AfDB), Canadian International Development Agency (CIDA), European Development Fund - Pan African Rinderpest Campaign (EDF-PARC), Aid and Cooperation Fund of France (FAC), German Agency for Technical Cooperation (GTZ), International Fund for Agricultural Development (IFAD), Norwegian Agency for International Development (NORAD), British Overseas Development Administration (ODA) and the World Bank (see Table 1). EDF-PARC funds are meant to operate as revolving funds.

ORGANIZATION

Private veterinary practice is already in place in some countries viz. Zimbabwe, Republic of South Africa and Kenya. Implementation of the scheme requires introduction of cost recovery measures, enacting legislation and/or amending existing ordinances and selecting beneficiaries and banks to handle the funds. In some countries national veterinary associations (viz. Tanzania, Kenya, Uganda) have been instrumental in the planning and implementation of this scheme. The involvement of these associations is most pertinent since the scheme directly involves its members who thus oversee on ethics and have an effective dialogue with the governments on policy matters eg. interest rates, collateral etc. However, for a successful scheme, the following factors must be observed and closely monitored by national veterinary associations and state veterinary boards:

The private veterinary practice should offer good quality and effective services.

The practice should preferably operate on the basis of partnership, engaging fellow veterinarians and paraveterinarians.

There must be a reliable and regular supply of pharmaceuticals, drugs, vaccines, equipment etc.

Practices should operate branches in extensive areas to meet the needs of pastoralists (paraveterinarians are most useful here).

Government subsidies for veterinary services should be removed.

Curricula for veterinary degree programs should be reviewed to include aspects of establishing and managing of a practice, writing of project proposals, computer training in respect of herd health management schemes, biotechnology etc.

Practices should provide regular (monthly) and mandatory reports to the government on notifiable diseases. Interesting cases should be published in journals.

The code of conduct as well as journals, text books, legislations etc. should be available at a practice.

SOME POSSIBLE CONSTRAINTS

While it is too early to state any definite constraints, the following factors may frustrate the scheme:

Reluctance on the part of the government to remove subsidies, an essential prerequisite to a successful scheme. The government should not compete with a private practitioner.

High loan interest rates may discourage veterinarians from going into private practice (eg. Uganda 50%, Tanzania 18%, Senegal 13.5%).

Lack of legislation and vigilance to protect practitioners from technicians who pose and operate as veterinarians.

Lack of matching funds by donor agencies to state operations so as to maintain a reasonable balance with private practitioners.

CONCLUSION

Whereas privatisation of veterinary services cannot be a panacea by itself, it nevertheless offers considerable hope for effective improvement of the livestock industry in combination with other efforts.

The challenge to the practitioner of tomorrow is that he (or she) will continue to serve a more elite group of farmers. These will be the sort of farmers who will attend to most of the routine farm operations and call a veterinarian only for complicated cases, consultancy and/or advice. Thus, in addition to being a clinician, a practitioner will be expected to be a consultant, i.e. an information manager and problem analyst. A practitioner must always be ahead of his clientele in terms of knowledge if he is to serve the customer's needs.

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Table 1: Recent Donor Assistance with a Bearing on Veterinary Privatisation

Country	Donor(s)	Main Focus
Burkina Faso	FAC, EEC/Parc	Village poultry/small ruminant vaccinations, Rinderpest control and privatisation.
Cameroon	BRD/IFAD	Private import and distribution systems; private practices for professionals and paraveterinarians.
Central Africa	IDA/IFAD/EEF/FAC	Drug distribution and herders training.
Chad	GTZ, EEC/IDA/FAC	Veterinary auxiliaries, privatisation with professional veterinary, mid-level technicians and herders associations.
Côte d'Ivoire	CCCE, GTZ/Parc	Village pharmacies and private auxiliaries.
Ethiopia	IDA,EEC/Parc	Service cooperatives and auxiliaries. Rinderpest control.
Ghana	EEC/GTZ	Study on privatisation of veterinary services.
Guinea	IDA/CCCE/FAC	Private imports and privatisation at various levels.
Kenya	IDA/FAO/OPEC	Private professional practices, privatisation of dips; cost recovery.
Madagascar	EEC,IDA/CIDA/NORAD	Animal husbandry and privatisation.
Mali	IDA/USAID/EEC/Parc	Herder associations, auxiliaries and privatisation of veterinarians and paraveterinarians.
Nigeria	IBRD/EEC	Various studies.
Senegal	IDA,EEC/Parc	Herder auxiliaries; privatisation of veterinary practices.
Somalia	IDA/GTZ	Veterinary auxiliaries; cost recovery measures.
Sudan	IDA	Privatisation with professional practices and auxiliaries.
Tanzania	EEC/Parc	Rinderpest control and privatisation.
Uganda	EEC/Parc	Rinderpest control and privatisation.
Zaire	IDA/FAC/CIDA	Rinderpest herder associations and auxiliaries.

Mohamed M. Fassi-Fehri - *Discussion Paper*

INTRODUCTION

Members of the veterinary profession carry out a wide variety of activities which are related to animal health management, improvement of animal productivity and conditions under which animals are maintained or used. They include the control of zoonotic diseases, animal and people interactions, and the inspection of animal food products to ensure quality and good health standards. The final aim is to improve the well-being of animals and the health and prosperity and quality of life for people. Consequently, the economic, social and environmental impact of the veterinary profession is considerable.

Veterinary services are activities carried out by veterinarians belonging to the private, public, industrial or military sectors. Each sector has its own vocation, its own particular characteristics and specific areas of competence, but in the final analysis, their activities are complementary.

The term "privatisation" means the transfer of goods or services from the public to the private sector. This transfer may be explained by the socio-economic system of the country or by the advantages which the private sector offers in carrying out such services. In the case of veterinary medicine, its dual social and economic role means that both sectors are important. Generally, everything concerning regulation, public health control and the well-being of national livestock belongs to the public sector. On the other hand, any service or goods provided for an individual animal owner belong to the private sector.

The objectives and the nature of the services currently required of veterinary medicine are listed in Table I. The division of these services into public and private sectors varies according to the national level of development and to its type of socio-economic organization. Four possibilities may be considered:

Countries with Liberal or Market Economics

Typical example - western European countries, North America and certain countries of Asia eg. Malaysia, Japan. In these countries living standards and incomes are high. Livestock is very productive. The size of herds is variable, but they are specialised. There is a wide variety of farm sizes and of the degree of sophistication of breeding and management techniques. Veterinary services fulfil many varied needs. Veterinary medicine concerned with companion animals is very active. Table 2 lists the sectors and the nature of the services for which they are responsible. It should be noted that in these countries the private sector employs about 78% of veterinarians, the public sector 17% and the industrial sector 5%.

Socialist Countries with State-Controlled Economics

In these countries, diminishing in number, livestock belongs to the state. Breeding is carried out in large farms administered directly by the state or by the cooperatives. A small proportion of livestock is in private hands and is personally managed to meet family needs. In these countries veterinary medicine belongs to the public sector, except for companion animals which are few in number.

Developing Countries

Generally speaking, livestock belongs to the private breeders. Stock breeding takes the form of either large collective herds, some on the move in search of pasture, or small farms with a limited number of animals which may be used for agriculture. In these countries incomes are low. Technical and sanitary supervision is provided by the state which employs 95% of veterinarians, using resources which are most inadequate in relation to needs.

Countries with Intermediary Incomes

Animal husbandry is practised in farms with small or medium size herds, which guarantee an income sufficient to allow the owners to benefit from advice and services from private veterinarians. In these countries there are also large industrial (dairy, pig, poultry) farms. Veterinary medicine for companion animals is beginning to be important.

FACTORS FAVOURABLE TO PRIVATISATION

A service can only exist or develop in so far as it satisfies and adapts itself to the needs and the demands imposed on it by society. Veterinary services are no exception to this rule. Furthermore, the direction taken by certain countries, especially in the last few decades, in their way of living and their production, with remarkable indeed, enviable results, suggest the general tendencies of the future evolution of veterinary services.

All the factors which favour points 1 to 8 in Table 1 accelerate the privatisation of veterinary services. These factors are related to large and small animal medicine and veterinary education.

FACTORS AFFECTING LARGE ANIMAL MEDICINE

These factors are related to the need to increase and diversify animal production with the aims of:

meeting the needs for animal protein resulting from the human population explosion;

satisfying the needs of populations whose income is increasing, causing a growing demand for animal protein;

responding to the consumer's demands in terms of taste and to the development of large scale catering, which implies the standardisation of the quality products; and compensating for the inadequacy of manpower due to a rural exodus, especially of the young, who are attracted by employment opportunities in towns and cities.

The intensification of animal production involves the supply of capital and banking facilities; the institution of insurance systems; increase of the production capacity of farms through larger numbers of more productive animals which are, however, more difficult to rear and less robust; the mastery of breeding and health management techniques; and greater efficiency in veterinary actions which are more specifically targeted, more precise and more specialised.

FACTORS AFFECTING COMPANION ANIMAL MEDICINE

The increase in numbers of recreational and companion animals and their diversity are the result of:

ever increasing urbanisation;

higher living standards and incomes;

the promotion of women's work and of the advent of two-salary households; and

the development of sport and leisure activities (horse riding, horse and dog racing, exhibitions, fairs and so on).

FACTORS AFFECTING VETERINARY EDUCATION

After satisfying the needs of the public sector, veterinary education and training stimulates the institution of the private sector whenever the conditions are favourable. This sector is more attractive to young veterinarians as it ensures a higher income, greater flexibility of organization and the possibility of directly applying acquired competencies.

HOW TO PROCEED IN PRIVATIZING VETERINARY MEDICINE

Privatisation occurs at the progressive demand of society, according to its needs, when the conditions discussed above are met. It is possible to identify a certain number of the means involved; they are the following.

In countries where there is no privatisation, the promulgation of legislation concerning the exercise of private veterinary medicine, specifying qualifications, required competencies, the scope of the monopoly granted, the means of exercising such medicine, rights and duties etc.

Another mean is to facilitate access to credit for installation and equipment.

The popularization through the media of scientific and technical progress in the fields of animal husbandry and health, emphasising that investment in animal health guarantees higher profits, constitutes another mean.

A further mean is the development of professional associations to facilitate access to technical developments and to maximise efficient use of resources; so is the codification of veterinary procedures to make them more efficient; and the promotion of private enterprise in veterinary education.

In disadvantaged areas, the facilitation of contractual activity to allow private veterinarians to take over activities belonging to the public sector (for example, the inspection of meat in slaughterhouses which does not require a full-time veterinarian, state vaccination campaigns, etc.) also constitutes a mean.

Table 1: Objectives and Nature of Services Required from the Veterinary Profession

1. Diagnosis, medical and surgical care.
2. Advice on animal production practices, (husbandry, reproduction, nutrition, housing and genetics).
3. Information and advice on health management and disease prevention.
4. Information and advice on livestock production, agribusiness and economics.
5. Specialised veterinarians in microbiology, biochemistry, pathology, toxicology, epidemiology etc.
6. Advice on nutrition, housing, reproduction, behaviour, training and use of companion animals.
7. Equine medicine.
8. Aquatic animal practice: health management, disease prevention, enhancement of productivity and quality.
9. Laboratory animal medicine.
10. Zoo animal medicine.
11. Standardisation, regulations, control and prevention related to:
    the safety and quality of foodstuff of animal origin (meat, milk and milk derivatives, fish etc.);
    infectious diseases (control of importation, animal movement, quarantine, sanitary slaughtering, disinfection...); and
    chemicals, drugs and biological products.
12. Epidemiologic surveillance (diseases, pollution), eradication programs for animal diseases.
13. Education, fundamental and applied research:
    education of veterinarians and stock breeding technicians as well as their continuous training;
    training of research scientists and development of knowledge in biology and medical services; and
    technology transfer and extension.
14. Development and testing of veterinary drugs and biologics.

Table 2: Sectors of Activity and Nature of Services Requested

1. Private Practice
    - large animal medicine (exclusively or predominantly) = 1, 2, 3, 4
    - companion animal medicine (exclusively or predominantly) = 1, 6
    - mixed animals = 1, 2, 3, 4
    - equine medicine = 1, 2, 3, 4, 7

2. Industrial veterinary medicine
    - livestock enterprise (poultry, dairy, swine, feedlot...) = 2, 3, 4, 5
    - manufacturers of pharmaceuticals and biologicals = 6, 9, 14
    - animal feed enterprises = 2, 5, 6
    - aquaculture = 8

3. Public veterinary sector
    - state and local public animal health and diseases control agencies = 6, 11, 12
    - diagnostic or control laboratories = 6, 9, 12, 13, 14
    - education and research = 9, 13, 14
    - zoo park = 10
    - environmental health and wildlife resources = 6, 11, 12

4. Armed forces = 6, 7, 11

5. Others

Daniel N. Kisauzi - *Impact of Recommendations of Previous Joint FAO/WHO Consultations on Veterinary Education*

INTRODUCTION

Privatisation of the veterinary services as a strategy (sometimes a policy prescription) for revitalising animal health care delivery systems and putting them on a more self-sustaining footing in developing countries is a relatively recent development. It is associated with economic structural adjustment programs initiated not only by the World Bank but also by other multilateral and bilateral donors (Mulder, 1992). As a recent phenomenon, privatisation was apparently not explicitly addressed by the recommendations of previous consultations. However, these recommendations can be analysed to assess whether their implementation could have had a negative or positive impact on the current efforts at privatizing the services. This paper attempts to do this against the background of a brief discussion of the training needs for those services that are susceptible to privatisation. It needs to be underscored at the outset that the issue at hand is the impact of the recommendations on the development of personnel with the skills, knowledge and attitudes needed for private veterinary services as distinct from those needed for the public veterinary services.

THE TRAINING NEEDS FOR PRIVATISATION

The services that can be provided by private veterinary practice in the short term are essentially those whose provision benefits an individual consumer (i.e. services with no externalities). The topic paper on "Veterinary Education for Private Practice" by Dr Ayanwale covers the training needs for privatisation in detail. However, for the purposes of this paper, it is necessary for me to highlight the qualitative and quantitative training needs for the predominant private animal health care personnel for the different livestock production systems that prevail in the developing countries. The qualitative needs as outlined by de Haan (1992) are summarized in Table 1.

The training needs for the companion animal systems (CAS) - though quite limited in the developing countries - may be complementary to the needs for the livestock sector. The needs for the elite CAS, covering the affluent class - mainly in urban areas - which puts a high value on companion animals and can afford to pay for expensive health care interventions, correspond to the intensive livestock production system; the needs of the semi-elite CAS, found mainly in peri-urban areas where owners are conscious of the need for professional health care interventions but can only afford to pay for some, correspond to the sedentary crop/livestock systems; while the needs of the non-elite CAS, found mainly in rural areas where owners are neither sensitised to the need for health care for companion animals nor able to pay for health care interventions, correspond to the pastoral livestock sector.

Table 1: Training needs for the dominant categories of private animal health care personnel for the different livestock production systems (Adapted from de Haan, 1992)

Production System	Personnel Category	Training Needs
Intensive	Professional veterinarians	a) Practical skills in interventions on high value animals b) Skills in reproductive management and A.I. c) Administrative skills in stock management and accountancy d) Computerised herd health and feeding management programs
Sedentary crop/livestock	Trained livestock technicians	Same as for veterinarians but less in depth
Traditional pastoral	Herder-auxiliary from the community	Frequent 3-6 day courses to fill skills gap in general stock management, identifying reliable drugs, and determining right drug dosages

The quantitative need for the different categories of private livestock health care personnel are determined largely by the size of the production system they dominate taking into consideration the fact that livestock units vary between production systems. In Sub-Saharan Africa (SSA) livestock production systems are dominated by the ruminant based pastoral system, which is found predominantly in arid zones, characterised by high animal mobility, traditionally managed, and serves a predominantly subsistence function; and the sedentary crop-livestock system, found in humid lowlands and cool highlands, commonly traditional and subsistence in function but with an emergent trend towards commercialisation (Jahnke, 1982). As examples, in Zambia 82% of the cattle, 97% of the sheep, 64% of the goats and 89% of the pigs are in the traditional sector (Department of Veterinary and Tse-tse Control Services, Zambia, 1991). In Ethiopia, 95% of the livestock population was reported to be in the peasant sector (Meskel, 1988); while in Uganda 95% of the cattle population is also in the traditional pastoral system (Kasirye, 1992).

Given that the demand for services in the pastoral systems is less than in the intensive systems, it can still be said that quantitatively the manpower demand for veterinary services is higher in the pastoral systems and, therefore non-professional technicians and herder auxiliaries are needed in the greatest numbers. Although the need for professional veterinarians is relatively low, they are essential for the intensive systems which are commercial and therefore prime targets of privatisation. The apparent contradiction in the foregoing statements highlights the dilemma faced in targeting the central personnel category for privatisation strategies.

THE IMPACT OF RECOMMENDATIONS OF PREVIOUS CONSULTATIONS ON THE TRAINING NEEDS FOR PRIVATISATION

Recommendations of previous consultations covered undergraduate education, training of animal health assistants (technicians), post-graduate education, continuing education, and manpower planning. Where these recommendations have been implemented, their impact on privatisation derives, firstly, from how their influence on curriculum development fits in with the training needs for privatisation and, secondly, on their influence on the manpower output by the training institutions.

UNDERGRADUATE EDUCATION

The recommendations directed at undergraduate curriculum content are summarised in Table 2. Except for the allusion to the need for proficiency in animal reproduction, there is hardly any overlap between the recommendations and the training needs for private professional services as outlined in Table 1. It is clearly evident that these recommendations were mainly geared towards producing veterinarians for the public sector. The impact of the recommendations on privatisation may therefore be judged to be minimal if not negative.

Table 2: Recommendations Relevant to the Content of Undergraduate Training Programs

1. Veterinary preventive medicine should form the basis of the veterinary curriculum.
2. Students should be trained to assess the socio-economic impact of animal diseases and veterinary measures...and to be proficient in animal production, human and animal health protection, animal reproduction, food hygiene, epidemiology, environmental protection and disease control.
3. Strengthening of the veterinary curriculum should emphasise economics of animal production and public health activities.
4. Extension systems addressing producer and consumer education should be implemented; i.e. the veterinarian should also be a public educator.
5. Students should be trained to appreciate the social backgrouod of their community and to devise relevant preventive veterinary measures and extension programs.

TRAINING OF ANIMAL HEALTH ASSISTANTS (PARAVETERINARIANS)

Table 3 summarises the recommendations relative to the training of animal health assistants. The emphasis of the recommendations appears to have been more on attitude training for community based activities in the public sector. Attitude is important in the private sector but if AHA are to function more effectively in the private sector they would need to rely more on their knowledge and skills in health care interventions on single animals or single production units. While traditional animal health care practices are important in traditional and the sedentary crop-livestock production systems which the AHA dominate, it is unlikely that traditional farmers would pay AHA for traditional services. Hence once again, the overall assessment is that previous recommendations on the training of AHA were not aimed at enhancing competence in the services required for the private sector.

Table 3: Recommendations Relevant to the Content of Training Programs for Animal Health Assistants

1. The training should provide for the social development of the student...to develop satisfactory relationship with the community which he will serve.
2. Adequate consideration should be given to...the potential role of demonstrably effective traditional healing procedures, and the benefits of close collaboration with NGOs and centralised government services for effective delivery of community-based animal health care.

POST-GRADUATE EDUCATION

Although there were many recommendations on post-graduate training, most of them focussed on facilitation of the training by national and international institutions. The recommendations that were directed at the quality of post-graduate education are summarised in Table 4.

Table 4: Recommendations Relevant to the Content of Post-Graduate Training Programs and Research

1. Post-graduate training should be relevant to the country or region; viz. animal production, public health, preventive veterinary medicine, and animal health and production.
2. Research in preventive medicine should be encouraged and supported.

The market for veterinarians with post-graduate training in the private sector in developing countries exists in private institutions such as development banks, pharmaceutical companies and NGOs (e.g. wildlife conservation and animal welfare groups). The requirements for these institutions are for people with a veterinary professional background but with either some in depth training in the social sciences (economics and management) or basic sciences (pharmacology, physiology, biochemistry and ethology). Admittedly the market is limited but it has to be planned for. Therefore, by their apparent bias towards post-graduate training for the public sector, previous recommendations have not facilitated the development of specialist personnel for the private sector.

CONTINUING VETERINARY EDUCATION

Previous recommendations were strong on the need for developing continuing veterinary education programs but did not specify the disciplines to be covered. Hence the possible impact on privatisation by the courses developed as a result of the recommendations is difficult to assess.

The FAO has funded a project entitled "Continued Veterinary Training and Extension Services to Farmers for Increased Livestock Production" (FAO/UNDP Project UGA/86/001) at Makerere University in Uganda. The courses given in this project can give an impression of the likely impact of previous recommendations on the activities of the FAO itself; they are listed below.

Artificial insemination
Food animal surgery
Clinical diagnostic techniques
Poultry diseases and their control
Rinderpest diagnosis and control
Tick-borne diseases and dip management

Helminth diseases and their control
Wildlife management and diseases
Contagious bovine pleuropneumonia - diagnosis and control
Animal nutrition and feeding

Going by the criteria set in Table 1, some of the courses can be judged as being relevant to private veterinary practice. If previous recommendations on continuing education influenced the development of the courses, then their impact on privatisation was positive. What is sad to note is that the courses stopped when FAO funding stopped. The problem with continuing education may therefore not be the relevance of the courses but their sustainability, especially in a privatized environment.

MANPOWER PLANNING

The potential impact of previous recommendations on professional manpower planning for the private sector would have been expected to arise from the recommended criteria for determining the manpower needs. Some of the recommended criteria are highlighted in Table 5. The focus on national socio-economic development goals and livestock units as key consideration in the planning process suggests anticipated manpower growth in the public sector since most of the livestock is in production systems where health care services have been funded by governments in the past.

Table 5: Recommendations on Veterinary Manpower Planning

1. Veterinary manpower needs should be planned at the national or regional levels based on livestock units and a variety of other factors.

2. Veterinary manpower development should be dealt with as an integral part of national socio-economic development.

de Haan and Bekure (1991) have estimated that taking the standard requirements for preventive and sanitary control tasks, a surplus of about 2,000 veterinary graduates already exists in Africa. Therefore, if the recommendations of previous consultations have been among the influences on professional veterinary manpower development for the public sector in Sub-Saharan Africa (although there is no objective basis for thinking so), one conclusion that may be drawn from the apparent surplus of manpower is that the planning premises were wrong. It may be argued that since development comes out of a surplus of resources, the privatisation of the veterinary services may be inadvertently facilitated by the existence of surplus personnel.

CONCLUSION

Recommendations of the previous consultations on veterinary education for the developing countries appear to have been overridden by the now fading philosophy of development through public funding, and also by the thinking that the primary functions of the veterinary services in developing countries are public health and the control and prevention of infectious diseases of animals. Scant attention was, as a result, paid to the training needs for private veterinary practice. If it is perceived that in the future the animal industries of the developing countries will depend more and more on private veterinary services (there are contentious debates raging about this view), then this consultation will have to make recommendations on the necessary changes in the content of training programs for animal health care personnel from the herder auxiliary, through the professional to the specialist levels.

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7. VETERINARY EDUCATION FOR PRIVATE PRACTICE

Lekan F. Ayanwale - *The Potential of Private Veterinary Practice*

INTRODUCTION

The potential of private veterinary medical practice is immense. Gone are the days when government jobs were readily available for new graduates. Even today, many veterinarians in government service show signs of frustration. The responsibilities are no longer challenging because of decreasing budgetary allocations to veterinary services, this in the face of an increasingly sophisticated clientele. To meet the different social needs both of the developed and developing countries of the world, private veterinary practice is one feasible alternative.

The practice of veterinary medicine, a profession that has one of its feet in agriculture, i.e. animal production, the other in medicine, is a life long pursuit. The practitioner of this noble calling must earn enough income not only to make him a happy contributor to the economic growth of his nation but also to justify the long training period in the university and the enormous amount of money invested in his training. His annual financial returns should adequately compensate, *inter alia*, the health hazards involved in veterinary practice, occasioned by injuries from animals or exposure to zoonotic infections.

Traditionally, the curriculum of most veterinary schools the world over, seeks to prepare the individual as a generalist who can minister to the health needs of all animals, great or small, for the welfare of mankind. This is an erroneous conception. The idea of a veterinarian being "jack of all trades and master of all" must change. If the profession would meet its expected obligations in the rapidly changing socio-economic and environmental conditions of the world, the curricula in the veterinary schools must also be modified.

THE PRESENT SITUATION

The changes advocated to prepare graduates for a rewarding private veterinary practice vary from country to country, depending on its level of economic development. In the developed nations of the world, in Europe, the United States, Australia and Japan, important economic livestock diseases such as rinderpest, contagious bovine pleuropneumonia, foot and mouth disease, trypanosomiasis, theileriosis, Newcastle disease, dermatophilosis, rabies, tuberculosis, brucellosis and swine fever that constitute serious hindrance to livestock development and public health are non-existent, eradicated or effectively controlled. This is not the case for many countries in Africa, Latin America and parts of Asia where those diseases are still major livestock as well as public health problems. Thus while the veterinarian in the developed parts of the world learns about the behaviour and nutrition of companion animals and the psychology of their affluent owners, his counterpart in the under developed countries prepares himself for the tough life of a large, animal practice at field level.

For the purpose of this presentation on veterinary education for private practice, I will use Africa where I come from as my case study to illustrate what is being advocated.

The human population in Sub-Saharan Africa is growing rapidly at between 3.2 and 4% per annum. This is faster than anywhere else in the world, an unfortunate trend which will continue for many years to come. In 1960 we were 210 million. This increased to 400 million by 1980. In 1990 it became 498 million. The situation is associated with rapid urbanisation where people, particularly the young, are leaving their farms and migrating to towns and cities. While this trend creates many social problems in the cities, it opens up many job opportunities on the farms for the private veterinarians. As more people move to urban areas, the increasing demand for food will enhance markets for eggs, fish, meat and milk. In Nigeria today, the animal protein consumption is estimated to be lower than 10% per caput per day. The British Medical Association recommended between 20 and 35% for developing countries. It is over 50% per caput per day in developed countries. This awful situation will encourage commercialisation of livestock farming in the developing countries where small livestock holders are encouraged to form cooperative unions. Because government veterinary services cannot meet the health and management needs of these commercial farms, more private veterinarians will be needed to offer their services. The situation will eventually encourage veterinarians to go into specialisation, on a species basis.

Further, the gross domestic product (GDP) in Sub-Saharan Africa grew slowly at the rate of 1% per annum during the 1980s compared with 3.0% in the industrial countries of the world. As a result, the per capita (personal) income is low and will further decrease as population increases during the 1990s. The World Bank estimates that our economies in Africa would expand by between 4 and 5% per annum for the next 10 years, if we are able to achieve self-sufficiency in food production. Since livestock production is usually a large component of the national GDP, the prospect for private veterinary practice therefore is good.

TYPES OF PRACTICE

Before we know what type of changes the present curriculum in our veterinary institutions should undergo, we must know the types of feasible private veterinary practice that the graduates would be involved in. The following areas of private practice can be identified:

Food animal practice, either small to moderate livestock industry, or large scale animal industry;
Veterinary public health practice;
Aquatic animal practice;
Companion animal practice;
Equine practice;
Exhibition animal practice; or
Wildlife disease practice.

The areas of private veterinary practice that I will chiefly advocate for Africa are food animal practice, and companion animal practice. Equine practice and exhibition animal practice are feasible only in developed countries where horses are in large numbers and used for luxury sports like polo, horse race betting and leisure. The use of horses as a beast of burden or in ploughing is of low value. The equine ploughing system is now confined to a few developing countries. Veterinarians in food animal practice can provide the needed services for those in this area. Exhibition animal practice pays only in the countries with privately owned zoological gardens which visitors on holidays patronise. The complex clinical procedures involving the use of such sophisticated techniques as laser surgery or ultrasonic imaging devices for diagnostic purposes are currently too expensive for developing countries.

Wildlife disease practice and veterinary public health practice are functions of government at federal, state and local government levels which the public (civil service) veterinarians can handle. However, it is worthy of note that private veterinary practitioners are often called upon, on contract basis, to help in these two types of practice.

AQUATIC ANIMAL PRACTICE

Aquatic animal practice for private veterinarians in developing countries will become a lucrative specialisation. However, this must wait for the future when our countries have developed water resources to support aquatic production and private veterinary practitioners (Agbede, 1992). In South-East Asia, aquaculture practice is becoming a major branch of veterinary work.

TRAINING TO SERVE SMALL TO MODERATE LIVESTOCK INDUSTRY PRACTICE

The small to moderate livestock industries are the types most commonly found in developing countries, because two basic necessities in livestock production, water and electricity, are either in short supply or totally absent. Farmers often resort to digging their own wells (not bore holes) from which water is drawn manually or with gasoline operated pumps. The veterinarian to serve this setting would be a large animal practitioner. Education should provide sources of information on:

Farming systems (dairy, beef cattle, sheep and goats);
Nutrition;
Disease prevention and control strategies;
Reproduction, including pregnancy diagnosis and artificial insemination;
Therapeutic and surgical services; and
Vaccination schedules.

The veterinarian should focus professional attention on livestock species like dairy and beef cattle, or sheep and goats, though other production regimes for pigs and poultry are becoming more important.

Depending on the population of farmers and livestock in the locality, some veterinarians can pool their resources and come together to form group practices. In addition to basic veterinary curricula (Table 1), courses in the economics of production, management practice, book or record keeping, communication skills and interpersonal relations are essential. A knowledge of computers and business information management would also enhance their practice efficiency.

Where the geographic area of the private veterinarian is small, he/she could expand practice to neighbouring towns if possible. The alternative is, if transportation costs are too high, to take on a multi-species livestock practice.

TRAINING TO SERVE INTENSIVE LIVESTOCK PRODUCTION SYSTEMS

Intensive livestock production may involve machinery and automation equipment. The driving force is a constant and uninterrupted supply of electric power and water. Management of large intensive livestock units by a private veterinarian requires a more complex educational background. Apart from exposure to basic veterinary curricula as shown in Table 1, the veterinarian might have basic education in electrical and mechanical engineering with the capability to repair minor faults. Training and experience should also include animal production, herd medicine, animal disease prevention, production economics, system analysis and information management system with the use of computer software packages. He/she must be able to monitor and detect problems in the operation and should know when the ventilating system of the brooding pen is not functioning well, when careless staff broke the sanitary regulations or when the feed was either not well compounded or has become stale or mouldy; all of which could affect production adversely. Finally, managerial skills must be such to enhance high profitability and financial returns.

COMPANION ANIMAL PRACTICE

This is a major form of private practice in developed countries of the world because dogs and cats have assumed the status of a family member. In Europe and the USA, private practice for companion animals is so lucrative that many veterinarians enter it, and will continue to do so for a long time to come. Even people in the developing countries of Africa are gradually becoming interested in keeping dogs in their homes as pets or reliable guards. The educational requirement for this type of practice includes nutrition, genetics, behaviour of dogs and cats, reproduction, housing, therapeutic and surgical care, vaccination schedules, grooming and other routine preventive medical practices.

CONCLUSION

Research is essential for the growth of any profession. It is desirable that further studies, at master degree or diplomate levels be pursued in the chosen area of specialisation. When in the field, the private veterinary practitioner should cooperate with government agencies, the relevant departments of his specialisation in the universities, and should join the professional association. Professional associations such as the World Association of

Small Animal Practitioners, Poultry Associations, etc. promote interdisciplinary responsibilities, ethics of the profession, continuing education and, above all, a growing and healthy nation.

Table 1 - Basic Courses for Doctor of Veterinary Medicine: 5-Year Degree Program in Nigeria

DVM I	DVM II	DVM III	DVM IV	DVM V
Anatomy	Anatomy**	Wildlife ecology*	Poultry diseases**	Public health and preventive med.
Biochemistry	Biochemistry**	Pathology**	Fish diseases**	Medical specialty
Physiology	Physiology**	Microbiology**	Lab animals	
Animal management	Animal management***	Parasitology**	Disease clinical	Medicine*
General agriculture*	Animal husbandry	Pharmacology and toxicology	Pathology	Surgery
			General and special medicine	Reproduction*
	General pharmacology			Clinics (necropsy and diagnosis)
	General pathology		Surgery and applied anatomy	Economics
	General parasitology		Reproduction	Computer methods
	General microbiology		Animal husbandry II	
			Clinics (including necropsy and diagnosis)	
* Exam at the end of 2nd semester		* Exam in December ** Exam in March *** Exam in June	* Exam at the end of 1st semester ** Exam at the end of 2nd semester	

1 semester = 15 weeks

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Douglas Bryden - *Discussion Paper*

Dr Ayanwale has provided a perceptive comment on the potential for the development of private practice, particularly in the developing countries, in the years ahead. It is encouraging to share his vision for the future and although he spoke largely of the progress which he hopes for in his own region I believe that his comments are relevant to the more developed countries where practice is already established.

The basic principles which will apply to the introduction of private practice in developing countries are also important in guiding the future development of veterinary services everywhere. The practice of veterinary science is a dynamic enterprise where to stand still is to fall behind. As the variety of veterinary services expands, as it always does, and the sophistication of procedures, equipment and facilities increases, then the pace of adaptation within the enterprise speeds up and one must run even to stand still.

For those who hold the responsibility for the education and continued development of veterinarians, this is an important concept. The type of undergraduate, postgraduate and continuing training which is successful at any time will not be adequate a few years later when the impact of the earlier training lifts the level of practice and with it the expectations of the veterinarians and the community. One has only to think of the type of practice which was common thirty years ago and compare it with the sophistication of today's animal hospitals to know that this is true. However the basic principles remain the same.

Effective learning is a science in itself where the basics always apply. The technology and the methods of delivery will change over time and will need to be applied in different ways in different countries. With the rapid changes taking place it will be necessary for the veterinary schools, and for those of us in the continuing education field, to be more concerned in the future of how well the message is retained and how effectively it is applied than has been the case in the past.

Problem based learning is now being introduced into a number of veterinary schools around the world. In Australia and in Canada the use of problem-solving, decision-making symposia and the introduction of modular distance education programs has proved to be enormously successful both in getting the message across and in the implementation of new procedures into practice. These innovations came about as a result of a concern at the *ad hoc* nature of continuing education, even in countries where it was well established and well received. The changes will continue with the development of computer-aided learning programs, video interactive modular programs and real-time video interactive conferences. The development of cable TV will allow veterinarians to take these programs in their own homes, and modems will enable tutors to work with participants for more effective learning.

Veterinarians graduate with fewer communication skills. There has been a realisation that the tremendous amount of factual information which the veterinary student is required to memorise, coupled with the volume and variety of information and techniques which must be mastered, leave no time in the undergraduate curriculum for the development of some of the more important skills required by the veterinarian in practice today.

Compared with agricultural and rural science graduates, veterinary graduates generally do not have the communication and resourcing skills required in advisory and extension work. The introduction of carefully supervised and guided project work and the provision of accurate, comprehensive and accessible information data bases would help to develop some of these skills, although it must be recognised that there are limits to what can be provided in the undergraduate years. Nevertheless it is true that as undergraduate education develops along these lines, as I believe it must, then the graduating veterinarian will be better equipped to develop the skills required for consultancy in practice.

As providers of continuing education we will need to recognise the change which this will make to the expectations of veterinarians for continuing education and professional development. It is likely that the two systems, undergraduate and continuing education, will develop together and that there will be an interchange of ideas as new methods of delivery are developed.

Veterinarians must be responsible for their own professional development. I believe that as a result of these new approaches veterinarians in the future will take more individual responsibility for their own continuing education. They will be keen to plan the areas where more attention is needed, to structure the programs for the expansion of their knowledge and skills, and to have a plan for their own future professional development. This will place new demands on those of us who provide continuing education, to ensure that we remain conscious of the immediate needs of the practising veterinarian while at the same time providing leadership within the profession.

Learning is a lifelong affair. Learning is not confined to the periods which we spend at school and in the universities. Learning is every hour of every day and veterinarians need to be guided in their undergraduate years so that the search for new knowledge and skills becomes a part of their professional approach. Accessing information data bases, conferring with colleagues and specialists, seeking learning opportunities and being meticulous about what they do must be second nature to them as professionals. If this can be achieved within the veterinary schools and supported by continuing education then veterinarians will drive the continuing education of the future.

Veterinary education must serve the needs of the community; these needs will vary from country to country, and they will vary within countries from region to region. There will be a range of veterinary services required as Dr Ayanwale has indicated; they are:

clinical service (small animal, equine, farm animals, and wildlife);
production animal medicine including aquatic systems;
consultative services; and
community advisory services, including local government (food quality, environment).

These veterinary services must also be cost effective, and as Dr Ayanwale has said need to provide adequate financial returns for the veterinarian. This is imperative to the development of private practice. However it is important to take into consideration the comments made by Dr Gros in relation to the role of the veterinarian in the community. This must be a matter for each government to decide, taking into account the best interests of the community as a whole.

Decisions must be made on how the undergraduate curriculum will be planned to cater for the need for these services. Continuing education will have the responsibility to fill the gaps and to continue the support for veterinarians in all areas relevant to them.

Veterinary education must enable new graduates to work effectively on graduation. Basic skills and knowledge are required to give new graduates a base for case experience to build on. This will vary from country to country and from practice to practice. Within the veterinary curriculum there needs to be a balance between the level of skills required and the time available in the course.

In the developed countries, training in small animal and equine medicine and surgery is generally good, giving graduates the confidence to enter this type of practice. However, in the fields of production and preventive medicine, graduates commonly do not have sufficient knowledge or experience at graduation to feel comfortable with this work. This is not an easy area in which to provide training for undergraduates, and veterinary schools will need to look at new ways of utilising the skills and knowledge of practising veterinarians who work in this type of practice. The system is being implemented in some schools.

Veterinary education must include communication skills. Communication skills are essential for all types of private practice, and necessary for the veterinarian to be a leader in the community. Dr Ayanwale has referred to the need for this type of training. I would suggest that the best way to include these skills in the curriculum is to provide problem solving and decision making projects so that the communication and resourcing skills are learnt in the context of this type of work. For instance, consecutive modules of a course may demand different types of interviewing and consultative skills. There may be a need to use progressively more and more sophisticated computer applications throughout the course. Case based problem solving modules will direct the veterinarian to research areas such as ventilation systems, shed design, nutritional management etc. and if carefully planned can lead the veterinarian through the learning process.

Veterinary education must provide for the need the veterinarian has for continued learning, such as communication skills; self motivated learning; use of case load for continued learning; use of the literature; use of specialist services and colleagues; and ability to evaluate data available and apply it to the practice situation.

The development of these skills should be learned through using them as undergraduates, as I have mentioned. By the time of graduation the veterinarian should be familiar with all the skills required. Well trained new graduates will also be able to upgrade the services of practices which they join and will learn very quickly themselves from the new cases they will see in practice.

Veterinary education must be built on basic principles. The basics of veterinary science and learning science should be used together to provide an effective approach to preparing the veterinarian for work within the community. We know that hearing, watching and doing is a more effective learning procedure, yet we still have many universities where lecturing is the main formal type of teaching. We must bring the curriculum to life with approaches which demonstrate the interaction between disciplines and which give the veterinary student a "real taste" of the responsibility which he or she will have on graduation.

Veterinary education must provide practical experience. This is as true for continuing education as it is for undergraduate education. With new developments in technology, simulation will play an important part in the training of veterinarians in the future. This will reduce the use of animals for training programs and in some cases will improve the learning experience.

Case studies are now used extensively in continuing education programs and are very effective. We know that many of these programs are now being reused in undergraduate training and this is an example of the interactive nature of undergraduate and continuing education. Actual case experience is of vital importance and every opportunity should be taken to schedule this type of work with tutors and with practitioners, in carefully monitored and well guided programs where follow up is a part of the assessment.

Practitioners need tuition and briefing in how to help students learn. Veterinary schools need to select practitioners carefully and give them official recognition as a part of the teaching team. This has been done effectively in Melbourne. While working with the practitioners or clinical tutors, assignments should form part of the requirement for the student. Access to the literature and other resources should be provided to enable the student to investigate thoroughly and to follow up on each case undertaken.

Veterinary education should train in preventive medicine. This requires skills in clinical medicine, epidemiology, animal science, economics, regulatory affairs and communication. There is a limit to how much can be included in the undergraduate curriculum and more needs to be done in the field of continuing education to provide this training for veterinarians. Probably the best training in this field is to work with a veterinarian who is doing this type of work. Even in this situation there needs to be structure and guidance for the veterinarian undergoing the tuition.

Veterinary education needs to include production medicine. There are similar difficulties and requirements as there are for preventive medicine. Using a project style of learning much of the basics can be covered in the undergraduate years and the skills needed can be practised during the process. This same approach can be used in the continuing education years.

Veterinary education must provide both the skills and the concepts. There is a need for both in the training of veterinarians. Skills give the veterinarian the opportunity to use the concepts in practice. In clinical practice it is often the skills by which the veterinarian is judged. For instance it is difficult to give advice to the dairy farmer if you are not familiar and competent in milking procedures. It is difficult to gain the confidence of the horse owner if you are unable to handle the horse.

Similarly a sound understanding of the concepts will further development of the skills used in the application of these concepts in practice. In other words veterinarians who are involved in consultancy work become more effective as a result of their experience.

Veterinary education is a continuous process. From the beginning of undergraduate training there is a gradual and incremental progression. It is important that this process be continued after graduation when some of the stimulus, the examination, is gone. There needs to be more recognition of the value of the practice case load as a learning opportunity. Training in writing up cases of all types and the desire and ability to collate and evaluate data from one's own cases can be a very effective learning process.

Continuing education programs will provide major upgrades in skills and knowledge for veterinarians after graduation when new techniques and approaches come into use. Ultrasound, new surgical techniques and clinical pathology procedures are examples of these topics.

Sometimes major learning programs are needed for retraining of veterinarians when they are moving from one type of veterinary activity to another. These provide a special challenge for those of us providing continuing education and with a trend towards streaming in the undergraduate years would require further development of our organizations. In Australia programs are now in place to provide upgrades for veterinarians who have been away from clinical practice for some time and wish to practise again.

CONCLUSION

In the development of veterinary services worldwide there is a need for a much greater emphasis to be placed on continuing education than has been the case so far. The restructuring of sound undergraduate programs will also be a challenge with resources contracting in almost every university. I believe that it will be through the implementation of more effective learning programs which will place more responsibility on the individual both as an undergraduate and in the professional years, that our profession will be able to meet the challenge of the next decade. There is an enormous amount of work to be done. I believe that the veterinary profession has an important role to play within each community. The standing of our profession world wide will be judged by how well we are able to provide the community with the range and quality of services which are needed.

José Manuel Berruecos - *Veterinary Education in Latin America*

Veterinary medicine on the American continent was originally almost unknown since the animals used for native diets were obtained through hunting and fishing as well as from insects, reptiles and frogs. Domestic animals like horses, cattle, sheep, goats and pigs, as well as the breeding methods and disease treatments came with the Spaniard's arrival, 500 years ago. These activities were done by specialists ("albeitares") and low rank soldiers.

The first Veterinary School on the American continent was founded in 1853 in Mexico, followed, ten years later, by the School in Guelph, Canada, and 25 years later in Ames, Iowa, USA. In 1883, the recently created science of microbiology was incorporated in courses when graduates who had studied with Pasteur came back to Mexico. Since 1863 to the present, animal production (Zootecnía) is part of the program establishing a difference with schools in other countries where veterinary training is focussed on clinics, surgery, preventive medicine and epizootiology.

The only Veterinary school in Mexico until 1957 was at the UNAM. However, little by little, new schools were created in the different states of the Republic. Today we have 32 public and eight private schools in the country.

With small differences, veterinary teaching in Mexico uses two educational systems: one is based on the "subject of the course study", taught in the classroom, laboratories, etc. The other one, is a system known as "modules" where the object of study is a problem that the student has to solve. Both methods have advantages and disadvantages and perhaps a mixed system could be a better option for the present.

Graduate studies began in 1969. Today we have 45 different Masters and PhD programs, throughout the country. The areas which are most highly regarded are pathology, nutrition, reproduction and administration. Research is done in schools and faculties although the most important work is carried out in the Ministry of Agriculture through the National Institute for Agriculture and Animal Research (Instituto Nacional de Investigaciones Forestales y Agropecuarias, INIFAP). Two scientific magazines with international reputation, an external editorial committee and wide distribution are published, "Técnica Pecuaria en México" (by INIFAP) and "Veterinaria México" (by the UNAM).

Two years ago, an evaluating program began through a joint effort by the Ministry of Public Education and the Council of Deans of the Association of Universities. This program has three levels: a self-evaluation level by each institution; evaluation directly by the Ministry; and evaluation formed by a scientific peer committee, people with high academic level and prestige who will evaluate other institutions with the help of their colleagues, and give recommendations for program improvements. This last method has given better results although the objectives of each system are somewhat different.

The evaluating process by peer committees begins when requested by the dean. A prediagnosis is done with data analysis. In this way, when the experts visit the institution they have all the necessary quantitative elements in order to analyse, in a more precise way, the qualitative aspects of the institution's operation.

The points for evaluation refer to input, processes and output. We must understand for input, the teachers, students, building infrastructure, equipment, laboratories, libraries and financing; for output, graduates, research products (publications, congresses, etc.), patents, and the relationship with the social environment. Nevertheless, the most important part is the teaching-learning process where the professional person is in reality being prepared to fulfil his/her commitment with society. The fundamental point here is to try to evaluate all interactions in each activity where the elements of the process intervene.

It is important to note that the reports given to the institutions are done in terms of a justified recommendation and possible solutions and future actions for them based on what was observed by the peer committees. Perhaps this situation will be extended by the committees or other branches, according with the North America Free Trade Agreement in order to guarantee programs and professional certificates.

Jean Piérard - *Minimum Requirements for Veterinary Education: Origin, Implementation and Relation to Previous Recommendations*

I would like to briefly discuss the main ideas which led to the writing of the Minimun Requirements (MR) in veterinary education and what can now be expected; also to consider the MR in the light of the recommendations made in the previous consultations of international agencies.

The idea of establishing minimum requirements in veterinary education throughout the world is not a new one. It has been discussed in almost every informal international meeting of educators for many years. In 1987 however, the World Association of Veterinary Educators was created under the auspices of the World Veterinary Association (WVA) at the time of the XXIIIrd World Veterinary Congress, in Montréal.

One of the first actions of the World Association of Veterinary Educators (WAVE) was to create a Steering Committee on Veterinary Education. The members of the Steering Committee were - and still are - Prof. Aline de Aluja from Mexico, Dr Dan N. Kisauzi from Zambia, Dr Edmund Prost from Poland and the President of the Association, Jean Piérard.

The objectives of the Committee are:

to establish a survey of veterinary education throughout the world;
to propose to all concerned advisable or necessary recommendations to help
teaching institutions to achieve their ends; and
to establish and maintain expertise in the area of veterinary education.

Actually, the committee is instrumental to the WAVE in order to obtain better co-ordination and quality of the studies leading to a veterinary degree in the world. The first task this steering committee grappled with was the writing of the minimum requirements in veterinary education. The task was a difficult one. These requirements had to be, at the same time, strong enough to meet high standards but also to allow for enough flexibility to be adaptable to the different situations in the world.

A draft was prepared and proposed to various individuals internationally to the World Association of Veterinary Educators, then to the Committee on Education and, finally, to the General Assembly of the World Veterinary Association which adopted these minimum requirements in May 1992. In May 1993, the Committee on Education of the WVA revised the MR again, in the light of about twenty comments received since their adoption. It should be mentioned that the number of modifications, from the original project to the last version, were relatively few.

From the preceding, it is clear that MR were prepared by educators for educators and, right or wrong, no formal consultation with the international agencies or experts, other than those on the Committee on Education of the WAVE, was ever held. The minimum requirements were prepared to provide responsible authorities throughout the world with an incentive to prepare better qualified veterinarians and to provide teaching institutions with a tool as efficient and as adaptable as possible to assure them they are producing qualified veterinarians, useful in their country or their part of the world, not only at a strict technical level but also at a truly professional - decision making - level. We believe that this latter aspect cannot be overemphasised. The role of the veterinarian varies, sometimes widely, from country to country, but the veterinary profession, like most other professions, is always an amalgam of technical skills and conceptual abilities; both are important and both are necessary. We must be aware of the dangers inherent to the loss of one or other aspect of our profession.

In preparing MR we also had to be very sensitive to the fact that education is, for a good part, linked to culture; like every matter related to culture, education too often appeals to emotions and irrational feelings which make both discussion and assessment very difficult. Happily, scientific and rational values and tact are shared by the vast majority of educators in the world. We also felt that it is much more efficient to consider the assessment of teaching institutions on a global scale rather than by an evaluation item by item.

We were essentially concerned with professional undergraduate education. We felt that this was definitely the first and most indispensable step. The emergency is this. Professional post-graduate education begins with undergraduate veterinary education. Like post-graduate training, but perhaps not to the same extent, it is linked to research; and sound research activities are essential to an efficient/professional undergraduate program. Professional education, post-graduate education, both professional and fundamental, and research are all linked together.

What comes next? Of course, as we have repeatedly mentioned, the MR will have to be revised and improved regularly. Our main challenges however, will be their implementation. As organizations, neither the World Association of Veterinary Educators nor the World Veterinary Association have coercive power. They do not have the money to invest in order to improve, significantly, the quality of veterinary education where and if needed. However, as supranational organizations these associations, and especially the World Veterinary Association, have moral power. We have to make use of this power. At its last meeting, the Committee on Education of the WVA proposed that the WVA implement a School Certification Program based on a self-evaluation made by the teaching institutions. This self-evaluation would be confirmed by available and willing representatives of the international organizations in the area, duly appointed for this by the Committee on Education of the WVA. The final recognition of the certified status of the school, college or faculty would be granted by the Committee on Education and proclaimed by the General Assembly of WVA.

The certified institutions should be listed separately and identified as such in the next editions of the World Directory of Veterinary Teaching Centres published by the WVA. The associated prestige to this would certainly result in a good incentive for institutions to participate. It was also emphasised by the committee that this certification program will have to be advertised as much as possible, primarily through the WVA Bulletin but also by all other possible means, including a deans' meeting which will be organised in Yokohama, at the time of the next World Veterinary Congress (September 1995).

Let us now consider the MR in relation to the recommendations of the previous international expert consultations which are typed in bold characters in the following paragraphs.

Veterinary education should cater to the changing needs of the society and the curriculum should be accordingly reviewed and adjusted. The training of veterinarians should be related to the specific national problems and yet meet international standards; it should last a minimum of five years, not exceeding 800 hours per year and include an adequate component of practical training.

There is no question, or problem about the necessity for the MR to provide for the adequacy of the curriculum and the needs of the society.

There is no opposition or divergence between local needs and international standards. International standards (i.e. MR) place the curriculum at a level, as high as possible and desirable, whereas local needs bring in the different orientations. The duration of the veterinary course recommended in the MR is comparable to that which was proposed in the previous recommendations if we consider the exclusion of the pre-veterinary training in the MR.

The curriculum should provide for a minimum of 4-6 weeks of supervised field work (or preceptorships) per year.

Constantly, in writing the MR we tried to avoid as much as possible the use of exact figures as requirements, keeping in mind that adaptability and some flexibility were important. We also considered that quantity and quality are not necessarily tied together. The MR state that "appropriate...practical training must be provided". We prefer that wording. Practical training is important, especially the clinical training which should be more beneficial to the student at the end of the course. It should be emphasised that preceptorship is excellent if well controlled by the teaching institution responsible for the student. It is also a good, relatively inexpensive, way to adapt the student to local realities.

Curriculum development should be based on educational objectives. Veterinary preventive medicine should form the basis of the veterinary curriculum; provisions for extensive practical training in the field should be included.

Teaching by educational or behavioural objectives has been in fashion for a few years. It is an efficient way of teaching in the sense that it allows for good rationalisation of the subject matters taught as well as a thorough understanding of the level reached by the student. However, educational objectives, to be written, require that the teachers are supported by a very efficient pedagogic infrastructure. It is doubtful that this support can be found in many places. Even if it may be wishful thinking, we could perhaps include a recommendation in this sense in the MR.

There is no doubt that preventive medicine is an essential part of the curriculum, especially in relation to food producing animals where it comes well before treatment. The MR refer to "treatment and prevention of disease" but perhaps do not emphasise enough the concept of prevention in their writing. This could be corrected.

Students should be trained to assess the socio-economic impact of animal diseases and veterinary measures; to work in close collaboration with other professionals in the field of animal production and public health; and to be proficient in topics such as animal production, human and animal health protection, animal reproduction, food hygiene, epidemiology, environmental protection and disease control. Strengthening of the veterinary curriculum should emphasise economics of animal production and public health activities; the education program in many LDCs should be reformulated to reflect this context.

All of the proposed subject matters included in this recommendation are covered in the MR. The training of students to work in collaboration with other professionals in the concerned fields is imperative. This is more a way of thinking than something which can be taught formally. A recommendation in the MR regarding this orientation would at least induce educators to consider it, instead of passing on concepts from previous times.

Greater emphasis should be given to animal production subjects.

Animal production subjects are, of course, of prime importance and adequately covered in the MR.

All veterinary students should have extensive practical training; i.e. field experience and contact with animals.

This is very true and was covered under recommendation 2.

The majority of teaching staff should be full-time. Teachers should be competent, full-time, permanent and have attractive working conditions. Action should be taken to improve the competency of the veterinary educators.

This is probably the most important item. The quality and working environment of the educators should never be submitted to a compromise. There is no one way of recognising the competency of a teacher; this is a sensitive matter which the MR dealt with in stating that a veterinary teaching institution must be of University level. Universities usually evaluate their teachers following several criteria; diplomas acquired (generally Ph.D. or equivalent), peer evaluation, publications and research activities and, more and more, by student evaluation. None of these criteria alone is enough but together they provide for a fair image of the quality of a teacher.

It is essential that the majority of the teaching staff - not all of them - be full-time which could mean that at least 80% of their activities (not time) are university activities, and that their main concern and income source be at the university. Again, some flexibility may be necessary in this definition for a time as the situation, unfortunately, varies widely from place to place and is far from being ideal everywhere.

To us, it is essential that the work load of educators includes a research component. A veterinary education institution should not be certified if no research is performed on the premises; this is a must. If not every teacher should perform in research, most should; this was well specified in the MR.

Regarding the attractiveness of working conditions it should be mentioned that even if salary and fringe benefits constitute an important aspect of these conditions, the possibility of being recognised otherwise, the facilities available, and the quality of the environment are very often better incentives than money for academics.

Extension systems addressing producer and consumer education should be implemented; i.e. the veterinarian should also be trained as a public educator.

Extension systems and public education constitute important tools to improve the agro-economic situation in most areas and are part of the duties of our profession. If this can be a responsibility of universities or teaching institutions, it could also be under responsibility of governmental authorities. It certainly could not be included in the MR although some training of the students in public communication could.

Veterinary schools should give due consideration to the recommendations emanating from the expert consultations.

We are convinced that most veterinary teaching institutions and veterinary governmental authorities of the world have it at heart to prepare the best qualified veterinarians and also realise the socio-economic importance of having a qualified veterinary manpower trained in their country. National pride is also a strong incentive for governmental authorities. The main problem in complying with the MR is obviously the lack of resources both financial and professional. Limited resources should mean better use and co-ordination of the available energies.

We strongly believe and hope that in a relatively short time international agencies, governmental and non-governmental organizations, international associations, educators and experts from all related fields will work together using the MR as their first and main tool to improve, radically, the situation of veterinary education in the world. We can assure them of the cooperation and availability of the World Association of Veterinary Educators and of the Committee on Education of the World Veterinary Association. Let us hope this is not just wishful thinking!

VETERINARY EDUCATION MINIMUM REQUIREMENTS

(Revised May 1993, Committee on Veterinary Education)

The wide diversity of the world makes the establishment of minimum requirements in veterinary education both imperative and very difficult.

Objectives of such requirements are to provide for the training of skilled individuals, useful in their part of the world. These requirements should not be used to classify veterinary teaching institutions in a hierarchic scale. The sole purpose of such requirements is to ensure a minimum in quality of training of veterinarians throughout the world.

Obviously, once these requirements will be adopted, a relatively long period of time (10 to 15 years) may be necessary in some areas for authorities to comply with them. In some instances, merging of institutions now existing may be unavoidable, either on a national or perhaps on a regional basis. The minimum requirements are not intended to replace the requirements now accepted in the scientifically and technically more advanced parts of the world. The MR are:

> A veterinary education institution must be of university level and must meet the standards specified by the World Veterinary Association (WVA) in its accreditation system. The veterinary curriculum must be under the immediate and sole direction of a veterinarian but does not exclude non-veterinarians from teaching. It must be adequately financed, housed, equipped and staffed.
>
> The duration of the veterinary curriculum must extend over a period of at least four years which does not include pre-veterinary training, during which a minimum of eight months each of instruction is given.
>
> The veterinary curriculum must cover in depth, and provide an appropriate understanding of, the following subject matters in relation to the various animal species and animal production systems of importance in the area:

Macroscopic and microscopic anatomy; Physiology (mammalian and avian); Biochemistry; Pharmacology, Parasitology; Microbiology; Pathology; Theriogenology; Diagnostics, treatment and prevention of diseases; Surgery; Veterinary economics; Animal husbandry and production (genetics); Botany; Cell biology; Environment; Professional ethics; Animal welfare; Population veterinary medicine; Laboratory animal medicine; Immunology; Epidemiology; and Public health, including meat inspection and food hygiene.

Appropriate library and audio visual facilities as well as sufficient clinical, laboratory, and practical training must be provided. Students must be properly supervised and evaluated throughout the course of their studies.

A veterinary education institution must be able to demonstrate that research activities are performed on its premises, contributing to the acquisition of new knowledge, both at the applied and fundamental levels.

A veterinary education institution must be able to assist veterinarians practising in whatever position, in the area or the country to cope with fast changing professional demands; i.e., provide continuing education.

The certification of a veterinary education institution to the above requirements should be made by an internationally organised body; i.e. the World Veterinary Association or the World Association of Veterinary Educators.

8. VETERINARY EDUCATION FOR PUBLIC SERVICE

Helen Scott-Orr - *Changing Roles of Veterinarians in Public Service*

INTRODUCTION

Veterinary education has traditionally been designed to fit successful graduates for either private practice or public service. A standard curriculum has been applied to students who are normally destined for one of these professional areas. There are a number of new roles for veterinarians in the public service organizations around the world.

Traditional roles include:

Field diagnostic and regulatory control of livestock diseases;
Laboratory diagnosis and research into livestock diseases;
Meat inspection and zoonosis prevention or reduction (VPH); and
Government administration and policy for improving livestock health and production and preventing the spread of zoonoses.

More recently, these traditional roles have been extended to include:

Inspection and administration of animal welfare standards, not only for livestock, but also for companion animals and animals used in scientific research;
Control of chemical residues in livestock and livestock products;
Greater regulating of veterinary chemicals;
Risk assessment for quarantine and quality assurance systems; and
Contingency planning for major exotic disease outbreaks and for chemical emergencies.

The implications of these changing roles for veterinary education are set out in this paper.

KEY REQUIREMENTS FOR DIFFERENT ROLES

Traditional roles of veterinarians in public service, as outlined above, require many skills, some of which are provided by standard veterinary curricula around the world. The essential proficiencies include good clinical and epidemiological skills, a thorough understanding of the principles of medicine, parasitology, microbiology, pathology and toxicology, and an understanding of livestock production systems, including genetics, nutrition and basic economics.

Also desirable, but not necessarily provided in detail at university are more general competencies. These include good communication skills, both oral and written, an understanding of rural sociology appropriate to the particular country, an understanding of how adults learn and extension methodology, and an understanding of the legal and regulatory framework in the particular country. Staff supervision and motivation is also an important skill which is usually acquired on the job rather than being taught at university. Basic financial and farm business management falls into a similar category.

In addition to the above, there is a series of special skills which are needed to cope with the emerging roles of government veterinarians. The administration of animal welfare standards requires an understanding of the science of pain and stress assessment, as well as greater knowledge of animal behaviour for each species being dealt with. There is also a need to understand the ethical and philosophical framework which is driving the animal welfare debate and which must be interpreted to animal owners or users. This can involve the public veterinarian in an extensive consultation process for which he/she may be ill equipped.

The increasing moves on tighter registration of veterinary chemicals and the control of chemical residues in food processing animals requires those veterinarians involved to acquire an in-depth understanding of pharmacology and toxicology, and the effects of numerous chemicals on animal physiology and biochemistry. It is also necessary to bring veterinarians up to date with the emerging world and international regulatory framework for chemical residues, which has such an important impact on trade.

Risk assessment for quarantine and trade purposes is another evolving area which is moving slowly from subjective assessment to more objective methodologies. These technologies use a combination of epidemiological, statistical and economic tools, and must be underpinned by detailed knowledge of livestock and livestock product trading patterns and the behaviour of different disease agents in different livestock products.

The progressive introduction of user-pay-for-service systems for inspection services such as meat inspection is drawing attention to the cost of having such inspection services carried out by veterinarians. Attempts are progressively being made to set up quality assurance systems and allow less detailed monitoring by government veterinarians and more reliance on abattoir management to carry out basic monitoring procedures. This means not only understanding the fundamental principles of veterinary public health but marrying these to systems analysis, hazard analysis and critical control point (HACCP) methodology and total quality management (TQM) principles. Traditional meat inspection roles will become partially replaced by microbiological and chemical residue monitoring.

Contingency planning for exotic disease outbreaks and other disasters is a particular skill which becomes of more importance as developed countries eradicate specific diseases and have more to lose from epidemics. An almost paramilitary approach is desirable for this contingency planning, with a high requirement for management skills, organizational skills and communication skills. Again, a detailed knowledge of the technical aspects of the contingency being planned for, eg. the likely behaviour of particular disease agents in different environments and livestock populations, underpins the general planning activities and makes veterinary involvement essential.

THE EXTERNAL ENVIRONMENT

Apart from specific veterinary roles in public services there are a number of more general features of the public policy environment which will impinge on veterinary education in the future. First the information explosion, both scientific and general, leads to the requirement for much better information handling skills. Increasingly computer usage becomes an inevitable part of this information handling. Students should progressively arrive at university already computer literate. The extent to which computer usage is introduced at university will depend on how far this technology has penetrated into a particular country. The pace of change is accelerating constantly.

There is increasing demand for public accountability, and an allied trend to legal action where individuals or companies perceive themselves to be often unjustly treated. This creates a much greater requirement for rational objective processes and policies which are well documented. Underlying this trend is an increasing suspicion of science and technology from some sectors of the community, which compels scientists to communicate their activities and objectives in lay terms, as well as to be sensitive to the concerns of the general community. An increased educational level of the community gradually leads to a greater requirement to persuade people than to instruct them. Issues that are perceived by veterinarians to be in the public interest must be justified clearly and broadly against competing priorities.

Increasing concern worldwide for the environment and for the preservation of global biodiversity is creating new areas for veterinary involvement, particularly in wildlife and endangered species management. Detailed understanding of wildlife biology, pathology and diseases may either help preserve endangered species or be used to design biological control programs against vertebrate pest species. It is also necessary for traditional veterinary practice and livestock production systems to be evaluated in terms of their impact on the environment, particularly in the area of waste management. Introduction of nutritional and management systems for animal production which reduce effluent or change its characteristics will become increasingly important in the future.

Grazing management systems designed to provide sustainable production without damaging fragile ecosystems require a broad ecological and adaptive approach. A traditional veterinary education does not necessarily provide the best framework to develop this. All these external features indicate a need for flexibility of approach in veterinary graduates, because of the rate of change and the conflicts between global food production requirements and competition for scarce resources for the world's population. It is predicted widely veterinary requirements will become more precise in the coming decades.

IMPLICATIONS FOR VETERINARY EDUCATION

The traditional veterinary education based originally on European models has served governments and the private sector well in the past. People emerging from the traditional system have been able to carry out traditional roles and make enormous strides in the eradication and control of many major livestock diseases and related problems. In traditional veterinary education there is usually emphasis in early years of the course on basic sciences (chemistry, physics, biology) moving on to more specific descriptive sciences such as anatomy and histology with substantial rote learning, before discussing "pre-clinical" sciences like parasitology and microbiology. Clinical sciences such as medicine and surgery are introduced late in the course. A background of animal husbandry, nutrition and genetics is provided through the course.

There is a variable amount of practical education in veterinary courses around the world (because of the high cost as well as varied cultural factors) and, sometimes, the urban location of the school. Because of the changing roles of veterinarians in public service and the external pressures detailed below, some change in the approach to veterinary education will be required to help students cope with the knowledge explosion and with future changes likely to occur. Suggestions for curricular changes include the following:

> Some provision to group and integrate subjects which logically relate to each other, eg. histology/pathology, anatomy/surgery statistics/epidemiology;
>
> Greater emphasis on principles rather than rote learning and better selection of key information which must be committed to memory (this may require some consideration of examination methods to better select people with good problem solving skills; and
>
> More emphasis on total systems rather than on various components of those systems, especially in the early years of the course. One example of the whole systems approach would be an understanding of farming systems (the economic, social and financial implications of livestock production); another, understanding of pet ownership, from both the owner's and society's point of view. A further example is integrated consideration of impacts of management and disease causing agents on the health and behaviour of animals.

The emphasis on teaching of whole systems first is a reversal of the current practice which tends to build up a complete picture from detailed building blocks of information. The aim would be to create the big picture in students' minds and provide a basis for them to pursue specific details and subjects in depth in the later stages of their course.

Emphasis on practical teaching should be maintained and/or encouraged wherever possible. Exposing students to practical experience will assist them to remember principles, systems or facts being taught. Every effort to place them in real "end use" environments should be taken, in order to provide more vivid and easily retained information. More use should be made of "sandwich" courses, with supervised practical work in between university based theoretical studies.

DELIVERY SYSTEMS FOR VETERINARY EDUCATION

It is evident from the above that it is increasingly difficult to provide veterinary students with information in undergraduate courses to fit them for any of the multitude of roles they may need to play in public or private practice. The course would become too long and too crowded for effective development of the required skills in emerging graduates. Modern veterinary education could begin with a basic science course with some mandatory subjects;

followed by a basic veterinary course dealing with principles and practical teaching in both pre-clinical and clinical subjects and livestock production and animal behaviour; followed by modules for specialisation in various areas which may follow a basic course directly or be taken up at a later date.

Formalisation of a system which allows a modular approach to training in specific areas would address the important issue of continuing education. The specialised modules would be available for the retraining of veterinarians who may have been left behind in a specific field and need to catch up or may wish to change from one area of veterinary practice to another. Some of these modules should incorporate intern assessments with practising veterinarians, on farms or in other veterinary workplaces. Internships should be structured and given considerable weighting in the progress of candidates through the courses. This, in turn, creates a secondary requirement for training the supervisors of such interns.

There are many *ad hoc* systems which have evolved in different organizations and in different countries to provide specialised post-graduate training at various levels ranging from short in-house courses through to formal PhDs. It is healthy that there be a diversity of post-graduate educational opportunities available to veterinarians and it is desirable that they be comparatively graded internationally so that there is more portability of specialised skills internationally.

CONCLUSION

Global technical pressures and increased communication and networking are creating an environment where veterinarians' roles in public service are changing dramatically. Many veterinarians trained in a traditional curriculum in developed countries are able to deploy their skills in developing countries but may find that they need major retraining to compete with other public sector professionals in their home countries. The need for the "traditional" roles of government veterinarians is diminishing in developed countries but is still needed in many parts of the world.

Developing countries are faced with the challenge of addressing traditional problems of major livestock disease control and veterinary public health but are also aware that they must address the emerging problems detailed above. A number of suggestions have been made as to how veterinary education for these evolving demands may be restructured.

Ismail M. Reda - *Discussion Paper*

The roles for veterinarians in public service organizations have been indicated in Dr Scott-Orr's presentation. These roles are numerous and liable to expansion. Beside being basically concerned with treatment of diseased animals, veterinarians must give increasing attention to animal welfare, health and productivity as well as being responsible for disease diagnosis, prevention and control.

Veterinarians have to play an important role in protecting animals from toxic chemicals and misuse of drugs and antibiotics; and thus protect people from chemical residues in animal tissues and products. They are also concerned with protecting humans from diseases and infections naturally transmitted between animals and man (zoonotic diseases) as well as from food-borne infections which constitute the most dangerous zoonotic threat for human health nowadays. Government veterinarians should have programs for protecting livestock from exotic animal diseases, some of which can cause devastating epizootics among animals (as rinderpest) and some, more dangerous, are of a zoonotic nature (Rift Valley fever). In addition, they should be responsible for quality control of vaccines, biologicals and drugs. The job of a veterinarian is even more complicated by requests for a more active role in developing and practising suitable procedures for the care and health of zoo and exhibition animals, and control of diseases in wildlife (eg. rabies) as well as their management for protection of endangered species. Companion animals, their husbandry, protection, treatment and health care belong also to the job of veterinarians. Moreover, the veterinary profession has to pay attention to the protection of the environment from pollution by traditional livestock production systems and care for the proper disposal of animal waste products.

Thus, veterinary education covers this huge body of relevant information which is growing very rapidly, not only because it deals with different branches of science, experience and technology, but also such information has to be applied to a large number of animals including aquatic species. It has also to give special consideration to certain subjects of increasing importance to enable veterinarians to do their jobs and face new challenges in practice. Following are suggestions for improvement of veterinary education to cope with the progressive responsibilities of veterinarians giving special consideration to groups of subject areas.

Subjects related to animal health and productivity: students must thoroughly understand biology at the cellular and molecular level in order to be able to follow the rapid developments in bio-technology and molecular biology and their application in veterinary science for the development of better diagnostic tools, vaccines, therapeutics and in production, animal behaviour, animal husbandry, nutrition, breeding, genetics, artificial insemination.

Subjects related to animal intoxication and chemical residues: pharmacology, toxicology, biochemistry, local and international regulations for the use of veterinary drugs and chemicals.

Subjects related to veterinary public health: food hygiene, zoonoses.

Subjects related to disease control: epidemiology, statistics, disease surveillance, economics of animal diseases.

To help students to cope with the knowledge explosion, the following suggestions can be considered. In classes, students are to be taught the basic information which they must know. Systems based on computers and software can be prepared by specialised institutions for international use. More time in the curriculum has to be given for the student to acquire the skills of independent learning and finding information. Specially designed videos can be helpful for continuing education programs.

The traditional broad clinical educational program which leads to the graduation of a veterinarian getting some knowledge about several different animal species can be modified by a curriculum also giving in-depth information on a single species or a class of animals to provide an enhanced level of knowledge and experience. Examples of such lines of specialisation are: food animals, companion animals, aquatic species and poultry. This would contribute to create diversity among veterinary graduates; to graduate better trained and experienced veterinarians; and to reduce the problem of surplus veterinarians in some countries.

When shall specialisation start? In larger countries, several veterinary faculties exist. They are located in areas with distinct animal populations. Thus, schools located in areas with a dense ruminant population would choose to develop high quality programs in food animals; others, in poultry or in aquatic animals etc. They can be developed as centres of excellence to offer high quality services to surrounding farms. Graduates may also get post-graduate training to be adequately prepared for specific career choices in the veterinary profession. This can be achieved through field training, continuing education, diploma courses, and research opportunities. In Egyptian faculties six-month training courses are given to students after finishing their five years of study. It is an integral part of the curriculum. The student gets training on farms, in abattoirs, at animal health centres and diagnostic laboratories, etc. under the supervision of faculty staff and highly experienced veterinarians working in these fields. In these same faculties there are twenty diploma courses. A diploma follows successful one-year theoretical and practical study, including a special clinical program, laboratory activities and field investigations.

Research in veterinary schools should be promoted to solve local animal health problems. Higher academic degrees - M.V.Sc. and Ph.D - are offered to research oriented graduates. Research is an essential part of veterinary education.

Veterinary curricula and evaluation procedures are used as tools to promote certain skills such as developing problem-solving skills; developing desirable professional behaviour and attitudes; acquiring essential psychomotor and technical skills; good communication ability; and the ability to find, organise and use information efficiently, think critically and take proper decisions.

Veterinary curricula should be designed to suit the country with regard to the animal population, socio-economic situation, and international relationships. Thus among the tasks facing veterinary education in developing countries are problems with faculty staff such as lack of funds to send them abroad for higher education; brain drainage of staff who go to better paid jobs in and outside the country; lack of funds for technology transfer and research; enrolment of suitable number and quality of students; and privatisation in the profession.

9. VETERINARY EDUCATION FOR FIELD RESEARCH

Rod S.F.Campbell - *Structure and Function of Field Research*

SUMMARY

Aspects of field research can be taught at any time in the undergraduate veterinary curriculum. They will be most effective during the paraclinical and clinical years.

Skills are best transferred by those who have practical experience of field research.

Effective field research may involve the farm, laboratory or abattoir in cooperation with the veterinary officer or practitioner. Each sector has individual training requirements.

Detailed training in applied research is best given at the graduate level. Graduate degree programs are most suitable for specialists. In-service training is applicable to any worker at the field level.

Health and production are indivisible. Veterinarians should take part in applied research on fertility, nutrition and farming system improvement where appropriate.

The benefits of field research must be delivered to the farmer. Communication (extension) methods are a critical part of the information chain and should be recognised in veterinary training.

Successful extension depends on a knowledge of the socio-economics of animal production systems and the proper use of veterinary organizations.

The concept of field research may be extended to include aspects of environmental health, animal welfare and wildlife studies.

There is a continuing need for applied veterinary research at the field level. In all countries the incidence and distribution of disease in the economic species must be monitored and methods of control applied. Indices of production, notably weight gain and fertility, should be tested in the various farming systems to improve economic returns. Countries affected by famine, insurrection or war have a special problem: some time in the future their entire animal production system will require to be reassessed.

AIMS OF FIELD RESEARCH

The aims of applied field research are clear, namely to increase animal production, enhance farmer income and improve public health. All of these aims are of national importance. To meet these general objectives the research worker can select from an array of methods including:

Simple surveys: In advanced countries a mass of data has accumulated on indigenous diseases of livestock. The list is increasingly expanded by problems in aquatic species, wildlife and other groups. Most countries still do not have a reliable data bank and considerable work lies waiting to be done. There is therefore a need to teach simple survey techniques and data analysis.

Epidemiological studies: The simple survey can be extended to become a more complex epidemiological study designed to give detailed information on the prevalence, incidence, distribution and variability of specific diseases, in other words, their dynamics. Such an investigation is more costly but may enhance a program of disease control.

Assessment of vaccination or treatment: Given the types of information provided by studies such as mentioned above, the worker may design intervention studies to show the values of a procedure in controlling disease. Cost benefit analysis can be built into the experiment. All of these studies will require competent laboratory support.

Productivity studies: The veterinary graduate must be concerned with the total farming system. Health and production are indivisible. In many countries the assessment of indices of production is an important part of the work of veterinarians whether animals are healthy or diseased. Body weight gain in young animals, milk or egg production and fertility may each be important aspects of the production system. Underlying disease factors eg. parasitism, bacterial or other diseases may be assessed as part of a multi-disciplinary study.

LOGISTICS FOR FIELD RESEARCH

The requirements for effective field research are usually more complex than they seem. To begin with they will almost certainly be multi-disciplinary, requiring diagnostic support from a competent laboratory. People must therefore learn how to work in teams with personnel from different organizations. This approach is not easily achieved or accepted in all countries. The problem may be sociological or organizational but it can be a serious brake on good field research.

Veterinary field services: Field officers are expected to carry out various roles, disease investigation and control, transfer of information to farmers (extension), quarantine surveillance and so on. In most countries where the private sector is not developed they do not work in tandem with practitioners. A cadre of veterinary assistants may be interposed between the veterinary officer and the farmer especially in large developing countries. Where field research is planned however, it is imperative that the veterinarian-to-farmer link is direct when the work is being carried out. Only the veterinarian has an adequate scientific background to assess the causes and significance of disease.

Regional laboratories: Accurate diagnosis is essential for field research on disease. In addition, communications must be good and rapid between the laboratory and the field and personnel should understand each other's role. There is therefore a training requirement at both ends of the axis.

Abattoirs: Meat processing plants can be a valuable component of field research. Surveys carried out using blood, urine or organs may provide indicators of the prevalence of disease in a district, region or country. Data may be used for simple quantitative analyses or form the basis of trace-back studies at farm or district level for more detailed investigation.

General practitioners: Where the private sector is well-developed practitioners may be included in the research team and assigned specific tasks such as project supervision, collecting clinical data, materials (blood, urine) or pregnancy diagnosis. The technical limitations of the practitioner alone in field research should, however, be recognised.

The farmer: The livestock producer is the first link in the research chain. Training for field research must therefore include an outline of extension methods for gathering information. The farmer should become involved at an early stage of project planning. Managers of larger commercial units are often well-informed and may even be graduates. Increasingly in LDCs in, for example, South-East Asia, farmers are informed through extension services, radio and television. In field research their confidence and interest has to be maintained throughout the project by good communications and regular reporting.

TRAINING LEVELS

The aims and methods of research can be implicit throughout the entire veterinary undergraduate course but conventional curricula and teaching methods may not encourage this principle. It is most likely to be expressed when the teacher is an active research worker, a condition that lies at the core of an effective university. There is no reason why aspects of field research cannot be conveyed to the student from the earliest days of a veterinary program by the use of appropriate examples. Apart from other teaching principles the interest of the student is greatly enhanced.

At the graduate level it is often not only possible, but highly desirable to include a field research component in the paraclinical as well as the clinical sciences. Research in the production sciences can also be strengthened if a field component is built into the project. Fundamental research of course has its own unique criteria.

Undergraduate training: The academic must stand well back from his subject and review teaching policy if field research is to become an intrinsic part of the course. This is usually not a traditional goal at undergraduate level. Other issues distract. Demands to include new data in the course; diversification of individual sciences by including new species, technologies or subjects, all create pressure within a finite and sometimes contracting time for teaching. The interested and experienced teacher will, however, be able to meet the challenge by reorganising existing material and the use of modern teaching aids, good printed materials, videos etc. The use of case studies, analysis of scientific papers or research results can convey both basic principles and give an insight into research methods at field level. Problem-solving exercises may include field examples. Many lecturers already do so but there is undoubtedly a need to spread the practice more widely.

In some veterinary schools a small research project is part of the clinical course, but its effectiveness in field research depends on the type and amount of material to which the student has access. Often the accessibility to field material of good quality is limited for geographic, economic or logistic reasons in urbanised faculties.

Clinical sciences: Scope for research at the clinical level is particularly urgent in developing countries where reliable field data is needed to design effective disease control programs. These may be related to a variety of species, cattle, camels, swine, small ruminants, poultry or aquatic animals depending on the most important farming systems and economic animals in the area. Undergraduate students can be used to collect national disease data.

Those who are being trained to take up positions as field officers can profit greatly from training in basic epidemiological methods. Epidemiology has reached a high level of sophistication in recent years, but since it will be some time before every field officer has a computer notebook, training should be realistic. Data selection, collection and analysis do not always need to be subjected to advanced computer methods but basic statistical skills are essential and these can be handled by a pocket calculator.

It is equally important that the student is trained to select problems that are of greatest economic importance. Some of these are subclinical. The temptation to concentrate on the more exotic, exciting and newsworthy diseases, should be tempered by the realisation that more mundane problems (mastitis, internal parasitism, protein deficiency, neonatal mortality, infertility) may have a greater effect on productivity and farmer income. National statistical data are not always the best guide as they may be based on traditional views that require to be reassessed.

The student trained in a realistic view of farming systems will be better prepared to assess the weak areas of animal production. Armed with a broad perspective of the system whether it is intensive, nomadic, or based on small farms, the student should be trained to design simple field studies eg. surveys that are likely to yield practical information. To do so effectively, clinical skills such as observation, sampling, data recording and interpretation can all be taught within a framework in the schools if the staff are sufficiently experienced themselves.

The capacity of the field officer or general practitioner to draw valid conclusions is limited without specialist diagnostic support. Then he (or she) must turn to the laboratory.

Paraclinical sciences: The core disciplines of microbiology, parasitology and pathology based on regional or central laboratories are the first line of diagnostic support for the field officer. This linkage, though fundamental, may be weak and difficult for economic, geographic or other reasons. If the field worker cannot depend on this support his success in research will be limited. It is therefore essential that in training students on the paraclinical sciences the role of the laboratory in field research should be emphasised.

The scope for field research based on the paraclinical sciences is almost unlimited. While the scenario varies from country to country, region to region and district to district, the skilful selection of problem areas and appropriate support by laboratory, abattoir or other facility can generate considerable information that may be valuable far beyond the experimental site.

No attempt will be made here to specify the important tasks that may be carried out by virology, bacteriology, helminthology, pathology and other specialisations in cooperation with field workers. There are plenty of examples to be drawn from the scientific journals which deal with applied veterinary research.

Graduate training: While undergraduate training can give valuable practical insights into field research, their significance may seem unclear to the student until the paraclinical and clinical years. The graduate who has some experience of laboratory or field investigations is much more attuned to the potential of applied research. Graduate training can also be designed to reinforce general principles of field research, perhaps through a course work component, as well as giving detailed experience with a field or laboratory project. Training at the graduate level must focus more sharply on the future area of responsibility of the student. These may lie at various levels of the system of veterinary organization as shown in Figure 1.

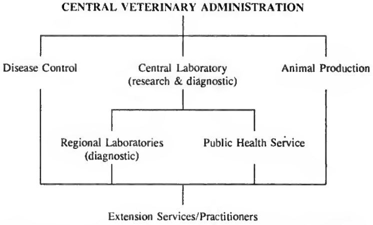
CENTRAL VETERINARY ADMINISTRATION
Disease Control
Central Laboratory (research & diagnostic)
Animal Production
Regional Laboratories (diagnostic)
Public Health Service
Extension Services/Practitioners

Figure 1: Structure of Veterinary Organization Supporting Field Research

"Field" research is a broad concept encompassing work at the level of the small farm, commercial production unit, abattoir, diagnostic laboratory and even the national surveillance level. It can involve any one of a wide range of economic animals, ruminants, monogastrics, avian species, as well as fish, crustacea and molluscs. All have many well-defined problems sometimes influenced by regional (eg. tropical) characteristics. Veterinary schools in different regions are increasingly proving their skills by offering specialised portfolios of training at the graduate level.

Similar opportunities exist in the production sciences. In the short term much can be done by investigating managerial causes of poor production through low nutritional levels or infertility. Longer term research is still justified for the identification and improvement of genetic material (breeds) most suited to the environment. Training of this kind may be provided by a faculty of veterinary science or animal science or even agriculture depending on the staff structure of the institution. At the same time it is to be hoped that non-veterinary staff will acknowledge and understand the potential effect of disease on production. Multi-disciplinary research should be encouraged.

There is a tendency for veterinary and other graduates to become species specialists. This movement should be commended as it allows the scientist time to study the total production system and the interaction of managerial, nutritional and pathological factors that may inhibit production. It is difficult for the individual graduate student to take an overall view of a research project but teams involving a cluster of students generate greater masses of data and can lead to a deeper understanding of a specific problem. The interactions between breed, nutritional levels, age group and internal parasitism reveal a much clearer picture of the total production system in the field than a project focussed on one aspect.

In-service training: The value of in-service training of graduates is increasingly recognised by governments in their effort to increase efficiency and improve the cost effectiveness of their policies. Short courses are the usual means of technology transfer. These may last one day, one week, one month or longer depending on the aims of the program. They have the advantage of minimal disruption of the organizations concerned. There is great skill in the design of an effective course which may be presented by senior members of the organization concerned or by external consultants who may be drawn from the commercial sector, national or international agencies.

The system has its pitfalls. It is essential that the curriculum is relevant, understandable and pitched at a level that will yield results of practical value to the farmer. The rush to high technology should be resisted when more appropriate intermediate technology is needed. Production should come before status, the farming system before the scientist.

Application of research results: The aim of field research is to get applicable information that will enhance production and the income of the farmer. Transfer of information and methods is the final stage of the process.

Communication skills are not a constant part of veterinary curricula but they should be discussed as part of the field research process since the trainees may be expected to become agents of extension. Some insight into sociological and economic structures, communication methods and audio visual techniques are desirable if the operation is to succeed.

BASIC STRUCTURE OF FIELD RESEARCH PROJECT/PROJECT APPLICATION

Field research, like marriage, should not be entered into lightly if meaningful and effective results are to be assured. Trainees should, therefore, be shown that the process is highly structured and dependent on many variables. At the present day, finance is among the greatest constraints. The following list contains the essential ingredients which should be examined before the project begins:

Justification (social and economic);
Objective;
Literature review;
Personnel;
Experimental design;
Materials;
Technical methods;
Budget;
Analytical methods and interpretation of results; and
Field applications.

It is recommended that undergraduate students in veterinary science should be asked to write a proposal for a research project based on these criteria. In this way they will be encouraged to see the problem in perspective and understand the difficulties of embarking on realistic research.

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William R. Pritchard - *Discussion Paper*

The quality and effectiveness of research, education and extension programs more than any other aspect of the development process will determine how well developing countries feed and support their growing populations in the uncertain years ahead. Rural sector development requires the constant improvement of human resources at all levels of production, processing, marketing, and support services, and the development or adaptation of new knowledge about these processes through research. Therefore, national strategies for development require that educational programs (primary, secondary and tertiary) be constantly evaluated and adjustments made as development progresses. It also requires that provision be made to create or adapt the new knowledge required to support all aspects of agricultural development. This paper will focus on a small component of the education and research agenda, post-graduate education in developing countries, and on the changing needs for the education of animal production and health specialists beyond the university level.

Emphasis in the past in assisting developing countries improve education and training for animal health personnel properly has focused mainly on professional veterinary education programs and on animal health assistant training. In all regions of the world there now are sufficient numbers of veterinary colleges to educate the professionals currently needed. Many of these institutions, however, are seriously underfunded and desperately need to be strengthened. There still is need to increase the output of various levels of animal health assistants in many developing countries. A less recognised need is the growing demand for post-graduate education for veterinarians engaged in research in national agricultural research systems (NAR) and for employment in the private sector in jobs requiring an understanding of research and research methods. Lasting progress cannot be made toward the improvement of animal production and health in any country without the underpinning provided by research on local problems constraining development.

Doctoral training and university research are special problem areas because they are the most underfunded of all major university activities in developing countries. Paradoxically post-graduate education and university research are being neglected at the very time that increasing numbers of trained scientists are needed to propel agricultural development in most developing countries. The fundamental reason for this neglect is that post-graduate education and university research are not perceived by policy makers in most countries to be relevant to development needs. Consequently, veterinary faculties in many countries do not function as part of the national agricultural research system and constitute an underused and potentially important source of highly skilled research workers. Faculties of veterinary science in developing countries will have to orient their research and post-graduate efforts to the solution of high priority development problems of their countries if they expect to receive a just share of scarce national resources allocated to education and research.

NATIONAL AGRICULTURAL RESEARCH SYSTEMS (NARS)

The national agricultural research systems in developing countries vary markedly as to sophistication and effectiveness. In all regions, but particularly in Asia and Latin America, many NARS are mature institutions, staffed by well trained research workers, and their programs are directed to the solution of important country development problems. In others, particularly in Sub-Saharan Africa (SSA) NARS are young, still developing institutions and research too often is poorly focused on national needs. In many of these institutions too many research workers are expatriates (29% in NARS in SSA in 1981-1985)[1] and there is too great a rate of turnover of professional staff. Support for NARS throughout the developing world is only 25% of the support of NARS in the developed world based upon agricultural gross domestic product even though many of the research problems in developing countries are much more complex than those of developed countries.[2] Another problem for many NARS is that donors fund special projects for short periods of time and require country participation in funding. This introduces donor bias and distorts national research objectives. Donor support, on the other hand, is critical to the survival of many NARS; consequently research administrators are forced to accept donor funding for their institutions to survive.

One of the most serious problems facing NARS and individual scientists in many developing countries is professional isolation. Lack of adequate library resources, especially current scientific journals, isolates scientists from the mainstream of science throughout the world. Few NARS can establish critical masses of scientists in very many areas of study. Consequently, many scientists must work alone or in very small groups. Funds for travel to national and international meetings, to visit other laboratories, or for study abroad are very scarce. All this leads to pervasive professional isolation which is destructive of research productivity.

One of the most serious problems in SSA is the small number of research scientists with PhD level training. In all the 49 countries of SSA there are only 1,000 research workers in animal production and health with BS level training or higher, 315 of whom also have the MS degree of which an estimated 100 have earned the PhD.[3] There are too few African scientists with adequate research training to lead the research on intensification and all of its ramifications which is an essential transformation if agriculture in SSA is to provide food and subsistence for the region's rapidly growing population. There is a critical need to expand post-graduate education for research in the developing world and particularly in SSA.

PRIVATE ENTERPRISE

As the movement toward privatisation progresses throughout developing countries there is an increased demand for veterinarians with research training for research tasks in private research and development enterprises and for posts in the private sector, not directly engaged in research, but for which an understanding of research is required. These activities are very important to national development.

PUBLIC HEALTH

As human and livestock populations expand and greater emphasis is placed on the health of people in developing countries, the public health function of veterinary medicine assumes greater importance. The zoonoses are among the most important causes of morbidity, particularly of children, in rural areas in many developing countries. Many veterinary public health tasks require veterinarians with advanced skill or research training.

NEED TO STRENGTHEN INDIGENOUS INSTITUTIONS

There once was a time when post-graduate education of veterinarians in developing countries could best be achieved by sending students abroad for their research training. Today the numbers required to be educated, the cost of sending students to developed countries for long periods of time, the number that do not return after completion of their training, and the growing lack of relevance to agricultural production problems of developing countries of many training programs in developed countries make it necessary that high quality post-graduate education programs be established in developing countries.

Most developing countries have established graduate education programs in subjects relevant to animal production and health in institutions within the country. Some are of high quality. Too many, however, suffer from an acute shortage of funding, lack of a critical mass of mentors, the absence of a dynamic research program, and the lack of an adequate research environment to sustain high quality post-graduate education programs.

It would be an impossible task to strengthen post-graduate education in all countries to the point that they would be capable of educating the modern productive scientists required to solve the complex and difficult agricultural production problems of the developing world. In regions such as SSA a much more workable approach would be to establish sub-regional post-graduate centres to be staffed and funded to provide post-graduate education for citizens of countries that share common problems in a discipline or related problem area. Other institutions within the area could focus on other post-graduate topics to serve the needs of the sub-region. Several veterinary colleges working together could develop high quality post-graduate education programs in a number of disciplines which would not be possible for any of the colleges to do alone.

CONCLUSIONS

There is a growing need in developing countries for veterinary scientists trained to conduct research to fill important posts in national agricultural research centres and for research and development tasks in private enterprises. Most of these scientists should be educated either within their country or in another country in the region. Most developing countries have established post-graduate education programs in some of the disciplines relevant to animal production and health. Lack of funding, research activity relevant to agricultural development needs, and other factors have made many of these programs inadequate for the need. There is a strong need to develop regional cooperative efforts so that a number of veterinary colleges sharing common problems can collaborate and develop cooperative programs to educate veterinarians for research tasks.

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10. RECOMMENDATIONS OF PREVIOUS EXPERT CONSULTATIONS

Neil Horadagoda - *Recommendations of Previous Expert Consultations: A Retrospective*

Following is a list of recommendations issued from Expert Consultations on Veterinary Education held in Rome in 1971, in Uppsala in 1978, and in Nairobi in 1984 and resolutions of the Pan Commonwealth Veterinary Conference, Harare, 1990. The latter are identified as CVA. This list was submitted to the experts before the consultation as background information. During the consultation these recommendations were to be reviewed, discussed and evaluated as to their possible impact. General questions such as the following were raised relative to each of these recommendations.

Has the recommendation been implemented?
Has its implementation had a certain impact?
Have the consequences been positive and sustained?
Have the consequences been negative or has implementation been abandoned?
What are the reasons for not implementing the recommendation? (lack of detail instructions, of funds, of political will...)
What can we learn from the follow-up, or lack of follow-up, given to these recommendations?

The recommendations are reproduced below; they are grouped by topics, some areaccompanied by additional questions raised in preparation of this expert consultation.

RECOMMENDATIONS RELATIVE TO VETERINARY MANPOWER NEEDS

Veterinary manpower needs should be planned at the national or regional levels based on livestock units (LSU) and a variety of other factors. Is there a satisfactory system to compute comparable LSUs (viz. the previously proposed units in the Table 1)? Are there alternative methods? Should there be national or regional planning? If both are needed, which nations, which regions?

Veterinary manpower development should be dealt with as an integral component of national socio-economic programs. Who is in charge of national socio-economic planning? How can we get input into this process? What advice can we give? Can we provide (standard) methods of information gathering? Can we provide specific data banks?

Veterinary manpower needs in terms of numbers, structure and qualifications should be projected (for at least ten years) before the elaboration of a new veterinary education program.

Table 1: Number of Livestock Units Proposed for Various Species

	Rome 1962	Rome 1963	Berlin 1971	Canada 1976
Camels	1.1	1.0	1.1	
Buffaloes	1.0	1.0		
Cattle	0.8		1.0	
Dairy Cattle		1.0		5.0
Beef Cattle		0.5		1.0
Horses		1.0	1.0	3.0
Mules	1.0			
Asses	0.8		0.25	
Pigs	0.2	0.2	0.14	0.25
		0.4		
Sheep and Goats	0.1	0.1	0.08	
		0.01		
Poultry	0.01	0.01		0.001

Needs for veterinary manpower and available resources in each country should determine the number, structure and location of veterinary teaching institutions required. Real needs for veterinarians, employment opportunities and availability of funds for full-time teaching staff should all be anticipated. What factors, formulae and equations are to be used to make such projections?

Planning of veterinary education should be co-ordinated with veterinary practice development, livestock development, food processing plans and educational plans of related professions.

RECOMMENDATIONS RELATED TO ANIMAL HEALTH ASSISTANTS (AHA)

Training institutions should have adequate training resources, including ready access to animals and clinical material; if not, alternative arrangements (residence, preceptorships) must be made.

The training institution should provide for the social development of the student...to develop satisfactory relationships with the community which will be served.

Salary and career prospects for training staff should be such as to attract and retain qualified personnel. Similarly for AHAs.

Developed countries should be encouraged to provide grants with an emphasis on courses rather than on individuals, and on ensuring that delivery centres are adequately equipped to provide their services effectively (CVA).

Adequate consideration should be given to the involvement of village communities in personnel selection, the potential role of demonstrably effective traditional healing procedures, and the benefits of close collaboration with NGOs and centralised government services for effective delivery of community-based animal health care (CVA).

RECOMMENDATIONS RELATED TO UNDERGRADUATE EDUCATION

Veterinary education should cater to the changing needs of society and the curriculum should be accordingly reviewed and adjusted.

The training of veterinarians should be related to the specific national problems and yet meet international standards; it should last a minimum of five years, not exceeding 800 hours per year and include an adequate component of practical training.

The curriculum should provide for a minimum of 4-6 weeks of supervised field work (preceptorship) per year. What are the potential conflicts between specific national problems and international standards (eg. shortage of government funds and need for low-tech veterinary care)? Have these recommendations been implemented? Where? Could these figures be incorporated into the proposed Minimum Requirements?

Curriculum development should be based on a definition of educational objectives.

Veterinary preventive medicine should form the basis of the veterinary curriculum; provisions for extensive practical training in the field should be included. Has this advice been followed? If so, where? Is it an acceptable premise? If so, how could it be translated into concrete guidelines and actions?

Students should be trained to assess the socio-economic impact of animal diseases and veterinary measures; to work in close collaboration with other professionals in the fields of animal production and public health; and to be proficient in topics such as animal production, human and animal health protection, animal reproduction, food hygiene, epidemiology, environment protection and disease control.

Strengthening of the veterinary curriculum should emphasise economics of animal production and public health activities; thus education programs in many developing countries should be reformulated to reflect this context. Has this been implemented somewhere? If so, where and with what results? What proportion (%) of the total curriculum is devoted to these areas in the developing countries?

Greater emphasis should be given to animal production subjects. How much is presently devoted to this subject? How much is adequate?

All veterinary students should have extensive practical training; i.e. field experience and contact with animals. Do they? If not, how could this be remedied?

The majority of teaching staff should be full-time. Teachers should be competent, full-time, permanent and have attractive working conditions. What does full-time mean? Eight hours per day, only one job, a good enough salary to provide for a family?

Action should be taken to improve the competence of the veterinary educator. To what extent are these recommendations being followed? Are there statistics on this?

Extension systems addressing producer and consumer education should be implemented; i.e., veterinarians should also be trained as public educators. Has this been done? Are there examples?

Veterinary schools should give due consideration to the recommendations emanating from the expert consultations. Is there reason to believe that they have done so?

RECOMMENDATIONS RELATED TO POST-GRADUATE EDUCATION

Post-graduate training should be promoted and given greater emphasis.

Specialisation should take place first by disciplines, then by species of animals.

Veterinary schools in developing countries should proceed to establish post-graduate study programs in appropriate disciplines.

Post-graduate training should be relevant to the country or region; viz. animal production, public health, preventive veterinary medicine, and animal health and production systems.

Planning and organization of post-graduate courses should be geared to the needs and conditions at national and international level; at international level, courses should reflect the needs of all participating countries.

Has there been an increase in post-graduate education opportunities for veterinarians in developing countries in the last ten years? If so, where, when, what areas (disciplines/species)? Are they in "appropriate" disciplines? Are they relevant to the country or region? How could they be made relevant to the country or region? Are they adapted to the needs and conditions at national and international level? If not, what are the obstacles, what could be some incentives?

Governments and foundations should make fellowships available to allow veterinary graduates to study at the most suitable centre, rather than in developing countries only.

Fellowship granting organizations should allow beneficiaries to study in their own region rather than overseas.

The selection of post-graduate students for international education should reflect the country's needs.

Arrangements should be made allowing post-graduate students to receive credits towards meeting requirements of their university, by studying elsewhere.

Does this suppose that the requirements are different? What should be the criteria used by a student from a developing country to do post-graduate work at home vs in a developed country? Should post-graduate students from developing countries, who do part of their post-graduate training in a developed country, be encouraged/coerced to receive their degree from the home university? What obligations do/should graduate students have for working in their home country upon completion of their post-graduate studies?

Employment of veterinarians with post-graduate training should be in line with their qualifications; they should be provided with the resources and environment conducive to optional performance. Are there models in developing countries where this has occurred? Should this be a *sine qua non* condition for post-graduate education?

Post-doctoral training, fellowships and opportunities for sabbatical leave should be provided by international organizations. Have such programs been implemented in developing countries? What type of international organizations "should" provide funds for these opportunities?

FAO should urgently establish a register of institutions offering post-graduate training and the nature of the programs offered. Does such a register exist? Should one be compiled?

UN agencies should give greater emphasis to the promotion of post-graduate studies in veterinary schools. How can UN agencies promote post-graduate education? Have they done so? Why should they do so, is it part of their mandate?

Appropriate funds should be available before starting a new international post-graduate program (re. staff, equipment, facilities, services).

Resource (staff, facilities, services) should be provided to an institution before starting up a new post-graduate program. Have new post-graduate programs been started in the last ten years? If not, what were the reàsons for not obtaining funds? If so, have they been appropriately funded, by which sponsors? Why were they successful in obtaining funds, what are the characteristics of their program that made them winners?

Post-graduate training and research should be strengthened through linkage and collaboration of national and international organizations and African countries.

International institutions (ILRAD, ILCA) should expand facilities to train post-graduate students from related institutions in Africa; such studies should be encouraged and supervised by a university. What is meant by "related institutions"? Have such linkages been established? If so, what are some examples? If not, how could they be encouraged?

The Commonwealth should be encouraged to provide scholarships and fellowships for both undergraduate and post-graduate training for personnel from developing countries (CVA).

RECOMMENDATIONS RELATED TO DIDACTICS

Wider use of veterinary biomedical communications should be made in veterinary education.

Implementation of innovative educational methods and programs should be considered.

Students should be trained to appreciate the social background of their community and to devise relevant preventive veterinary measures and extension programs. Can we have specific examples of what is done or what could be done? Are there provisions in some veterinary curricula for community training? If so where?

Communication and understanding between students and staff should be promoted.

Guidance for improving the evaluation of student performance and of teaching effectiveness should be given. Has such a guide been produced? Could it constitute an annex to the proposed Minimum Requirements?

Regional training courses should be organised for teachers of intermediate level animal health personnel.

Research in veterinary preventive medicine should be encouraged and supported. Has this occurred? If so, where? If not, how could it be achieved?

RECOMMENDATIONS RELATED TO CONTINUING EDUCATION

Continuous training should be undertaken during the whole of a veterinarian's career.

Short courses should be offered for the continuing education of veterinarians; ILCA should compile a list of such courses.

FAO should compile information on facilities available globally for continuing education and recommend expansion and networking of such facilities. Is there a list of short courses available for continuing veterinary education in developing countries? If so, who produced it when was it edited/updated, where is it available, how much does it cost? Or is it in preparation? If not, what are the obstacles, is the need for such a list still actual, which would be the best agency to produce it?

Encouragement should be given to expansion of the new technologies for distance learning (satellite broadcasting, down-time television) to developing countries, and the reciprocal production of educational programs for use within the Commonwealth.

The CVA should encourage the development of regional centres for post-graduate and technical training workshops and seminars, and also encourage the flow of visitors from developed countries to undertake research at these centres while contributing to their teaching and training programs.

The CVA decided to approach pharmaceutical companies, FAO, CTVM and other organizations to obtain audio-visual material for distribution within the Commonwealth.

The CVA agreed to allocate a budget of £5,000 for books and audio-visual programs and to identify experts in African and Asian training schools to explore the possibility of amateur production of training materials.

SPECIAL REQUEST FOR FAO AND WHO

FAO/WHO should take these recommendations into account when elaborating manpower development and education programs in animal production and public health.

FAO/WHO should take steps to co-ordinate veterinary education at regional and global levels.

FAO/WHO should continue to update the world directories of veterinary schools and AHA training centres.

FAO/WHO should convene an expert consultation in educational methodologies for undergraduate, post-graduate, and field training and for producer and consumer education.

FAO/WHO should intervene with council and guidance (policy advice) for governments before new education/training institutions are established.

FAO and other agencies should assist education/training institutions in improving their resource and the efficiency of their co-operation at regional levels.

FAO should sponsor an expert consultation on intermediate level training (AHA).

FAO and other agencies should assist in resolving the lack of current journals, textbooks and other teaching aids for use in training of AHAs.

FAO and other agencies should assist experienced teachers to produce relevant textbooks.

THE NEEDS OF VETERINARY EDUCATION IN DISADVANTAGED COUNTRIES: A SURVEY BY THE INTERNATIONAL VETERINARY STUDENTS' ASSOCIATION

Stephen Butterton

A standard letter was sent by the International Veterinary Students' Association (IVSA) to student societies in 262 veterinary colleges in disadvantaged countries. This report is a brief record of the replies, with summaries at the end of each geographical area, and some discussion of the conclusions. Thirty-six replies were received from 26 faculties in 20 nations across 6 continents. Unless otherwise stated (in parenthesis) the replies were provided through student associations.

Albania, Tirana

Facts: There are 1100 students following a four-and-a-half year course. Total restructuring of the curriculum is in progress in order to reach Western European standards.

Problems: The economic situation results in poor support for veterinary education. There are no computers in the entire faculty and the library has not bought textbooks or journals for more than three years. The laboratory equipment is considered very poor. There are too many students for a country of its size. Until now only farm animals were given proper attention and there is little knowledge about small animals. There is a need to learn Western languages, but it is difficult to find appropriate literature. The only aid received up until now was a FAO donation for two scientific laboratories. Laboratories and practical facilities must be improved to support teaching and to permit scientific research. Albania is a hilly country and livestock are very important for improving the economy. The 65% of people who live in villages would benefit from improved agriculture due to better pasture management and the richer economy that would result. Animal welfare is neglected in Albania even by many professionals.

A letter was received from the principal of the college explaining in detail the history and structure of their faculty. A specific problem was the recent changes that have resulted from the demise of communism. In the past, livestock zootechnic experts (responsible for organization and management) and veterinarians (in charge of animal health) were trained separately to be employed together on the state-owned farms. This was a waste of resources and contributed to the inefficiencies of state farming. The system is a problem now that farms are being broken up and turned over to private ownership. The aim of the college is to amalgamate the functions of veterinarians and zootechnicians to produce professionals who are capable of dealing with both aspects of this work.

Bulgaria, Stara Zagora

Problems: There is a general lack of literature dealing with specialised subjects such as nutrition and so on. There are insufficient teaching aids. (Faculty member)

The great social and political changes since the demise of communism have affected the running of the library. Previously the state had exerted complete control with the result that direct contact with foreign publishers and writers was extremely difficult, and external authorities were deciding what books and journals the schools should have. Now universities are more autonomous and the college has a book-exchange scheme with 26 countries, receiving much gratis from some places since the amount of free currency available for buying books is very small. (Library staff member)

Improved international contacts for students and academics is considered essential both in the form of foreign scientific literature and in travelling to gain practical experience abroad. (Faculty member)

Estonia, Tartu

Problems: The country is in a period of great change but there are severe financial limitations. The biggest issue is the desire to join the EC and, therefore, educational standards must be brought up-to-date. Students require a better understanding of Western languages to learn properly; faculty and young graduates need experience in Western Europe to become better teachers. Government ministries have promised assistance in this area but the I.V.S.A. is the window for achieving practical reality. Young specialists must have greater opportunities for travelling.

Latvia, Elgava

Problem: There are too many practitioners. Their goal is to approach the standards of Western Europe.

Moldova, Kishinev

Facts: The faculty opened in 1974 and has several departments, 500 students including 50 foreign students. Since opening, 11,500 veterinarians have graduated, 2,500 from abroad (mostly from the Third World).

Problems: There are many difficulties including shortages of textbooks and modern laboratory equipment. The preparation of veterinarians for small animals and "companion birds" is inadequate. The respondent wants a chance to study in the West regarding these problems. (Assistant Dean)

Ukraine, Kiev

One foreign student seeks an opportunity to study in the West for some time and more information is required. (Foreign student)

Ukraine, Kharkov

Problems: Many books are outdated and there is a lack of access to foreign scientific literature. Archaic diagnostic equipment and a lack of biochemicals restricts scientific and clinical practical classes. Practical experience for students is inadequate. There is a need for improved skills in English and German. The Ukrainian economy has a large agricultural potential and needs improved veterinary skills.

Russia, Krasnodar

Facts: The School was founded in 1976 and has 500 students plus 42 readers and scientists within six departments.

Problems: The respondents want to discuss specific clinical problems. Generally, a lack of equipment and foreign literature is the biggest complaint. The processing of agricultural waste is a problem in the country as a whole. (Dean of the Faculty and student representative).

Russia, Moscow

Problems: A library to make international books and journals available would be useful. Access of researchers to foreign travel is still restricted.

Russia, Buryat Agriculture Institute

Problems: A general lack of finances exists throughout the country. Contact with farms and working veterinarians is limited so students do not get enough practical experience. The college does not have enough animals for clinical studies and it cannot afford modern medicines or practical equipment for training. Students would benefit from improved language skills and foreign travel.

Summary (Eastern Europe)

Lack of good textbooks and foreign scientific literature;
Lack of scientific equipment;
Little training for companion animal medicine;
Limited opportunities to travel to the West;
Inadequate practical exposure for students;
Need more training in languages;

Need better teaching aids; and
Animal welfare neglected.

Many countries were ill-prepared for the change from centrally planned economics to free-market capitalism and this has important implications for the role of veterinary professionals. All are wishing to attain the standards of veterinary training in the West so their nations can join the EC.

Brazil, São Paulo

Equine practice in this country is very intense but there is a lack of appropriate veterinary literature.

Cuba, Santiago de Cuba

Problems: A general lack of scientific literature and other aids for teaching affects students and professionals alike.

Chile, Universidad Austral de Chile, Valdivia

Facts: There are 600 students at the faculty in a university of 8,000. The faculty opened in 1955 and since then more than 1,000 veterinarians have qualified.

Problems: One of the main objectives is to establis a proper scientific library for the students; additional textbooks and journals would be very useful. They are trying to set up a proper computer room with software available for students and researchers. They have difficulty in criticizing their education objectively because they do not have proper standards with which to compare. They believe they have too many students. They would like a basic laboratory with clinical instruments for the students to use since most of the existing equipment was donated by international sources and is only available for researchers. These are only some of the problems.

Mexico, Villahermosa

Problems: Communications are difficult and the insufficient demands of school work and lack of field practical experience impede education. Assignment programs are considered old and disorganised. There is a lack of resources, teachers and incentives for students in the schools.

Mexico, Universidad Autónoma Metropolitana

Facts: Academic exchanges exist with many other countries including Czechoslovakia, Spain, Germany, France and Cuba.

Problems: The lack of reading material means that many students have to travel to other institutions in Mexico to get references. Many students have problems with the fact that most of the literature is published in English, and the college does not have enough resources to teach English and some other subjects as well. The college is trying to improve its teaching by seeking the help of visiting veterinarians from abroad, but the lack of equipment makes this an up-hill struggle. At the moment they are trying to improve their ELISA (enzyme-linked immunosorbent assay) diagnostic techniques which they believe will vastly improve the control of livestock diseases. To do this successfully will require more specialised equipment, access to appropriate literature and better training of technical staff and veterinarians in the use of ELISA diagnosis.

Summary (Latin America and Caribbean)

Lack of specialised literature;
Highly politicised environment which affects communications;
Insufficient demand of work and practicals;
Lack of teaching resources and incentives for students;
Problems in learning English in order to understand the literature;
A need for training in modern clinical techniques;
Too many colleges and students; and
Lack of proper standards for assessment.

Kenya, Nairobi

Problems: The major problem is finance. They used to carry out seminars to educate local people, but cannot do it any more. Education of local people could help lead to the eradication of many livestock diseases. Scientific literature is very expensive.

The high cost of textbooks means that students cannot afford them and the library can afford very few. They have enough lecturers but would like more specialists. They need more laboratory and clinical equipment, as that which they have is old or non-functional. Old equipment was designed for much smaller classes, and practical groups are too big. There is not enough clinical equipment for students to get experience and too few ambulatory vehicles for taking students into the field. The majority feel that problems should be tackled from outside the school, which means improving their field work, including the management aspects of their training. In Kenya, veterinarians are expected to serve as livestock officers. There are no modern standards, those that exist are unchanged since colonial times. A veterinary field hospital would be most useful, as this would have multiple benefits for the local communities and veterinary skills. They need donations of surgical equipment from richer countries and would benefit from internships in the West.

The small animal clinic does not have enough equipment for surgical operations. Modern equipment that exists such as the electron microscope is often in a state of disrepair. Student halls are in very poor state of hygiene. (Visiting clinical student)

Nigeria, Sokoto

Facts: It is one of five colleges and has 183 students, with the first ten students graduating last December.

Problems: There is a shortage of textbooks and audio-visual aids, such as projectors and educational cassettes/films. The laboratories are very poor.

Nigeria, Maiduguri

Problems: The general public does not appreciate the value of the veterinarian and unqualified people have damaged the image of the veterinarian. Many financial sponsors of students think the course is too long. There is a general shortage of textbooks and journals, teaching aids and laboratory equipment. There are not enough funds for research and there are no aid packages for veterinary education. Teachers are often poorly trained. There is a need to convince nomads to settle and thus protect the environment from over-grazing and other problems which contribute to the progressive desertification of the countryside in Nigeria.

Ethiopia, Addis Ababa

Facts and Problems: Ethiopia is first in Africa and tenth in the world for livestock production, which is thus very important in the economy, although under-exploited; for example, hides and skin. Assistance has been provided by schools in the UK, USA, France, Sweden and so on. Malnutrition is widespread, especially in the form of protein deficiency. They have one veterinary school for a large population, which produces 23 graduates and 50 diplomates per year. 1993 is the ninth year that veterinarians have graduated and there are only 250 graduates. Post-graduate study is limited. They consider that there is a lack of government attention to animal health. There are few clinics in most of the country and many 1992 graduates are unemployed. The veterinary profession has a low status. There are insufficient teachers which means that new graduates are expected to start teaching immediately. Good scientific literature is not available. Students cannot take textbooks home to study and there are no books available to buy as there are no bookshops selling veterinary texts in Ethiopia.

Poor animal health, poor genetics and human malnutrition are the major issues. The lack of experienced lecturers and shortage of necessary books are the biggest problems affecting their education.

Sudan, Khartoum

Problems: Students based in the UK were active in arranging exchanges, but their activity has stopped. Very few exchanges are taking place despite membership of the IVSA. They have a great shortage of textbooks and laboratory equipment.

Guinea, Faranah

Problems: Lack of equipment and literature. Assignments inadequate. Not enough practicals to apply theory to problems of animal health. Laboratories have been built which are poorly equipped. Farm animals of major concern. Environment will benefit from better animal management by better human health and better pasture management, also better rural economy. (Faculty member)

Tanzania, Morogoro

Problems: Lack of textbooks and reference material is the most serious problem. Equipment for survey and avian diagnostic kits are in short supply. Teaching aids such as video tapes, overhead transparencies, overhead projectors, microscopes, equipment for practicals (eg. ECG machines), equipment for experiments on nerve and muscle (eg. oscilloscopes) are all in short supply.

Zaire, Lubumbashi

Problems: There are not enough well-trained teachers and they lack clinical and laboratory equipment. They need new literature, ideally in French but English would be useful too. There is an inadequate loan structure in their country which makes financing studies very difficult.

Summary (Africa)

General lack of financial support;
Lack of scientific literature and equipment;
Poor resources for training local people;
Field work regarded as most important;
Standards in universities out-of-date;
Students and post-graduates would benefit from travelling more;
Lack of teaching aids;
Poor public image, low numbers of veterinarians;
Lack of research; and
Poor government attention to problems of animal health (some countries only).

Malaysia, Selangor

Problems: There is a lack of literature, which was made worse since many books were destroyed by a recent fire. The horse racing industry is currently growing rapidly, but they lack adequate veterinary skills in that department. They want to contribute information and skills to the West and so create a two-way flow of knowledge, i.e. participate more actively in exchanges.

Indonesia, Gadjah Mada University, Jogjakarta

Problems: They have an active equestrian club but a shortage of scientific literature on that subject. The biggest problem is that Indonesia has a shortage of practising veterinarians (3,500) in a country with 15 million cattle; and many work in the big cities, relatively few are employed in rural areas. The learning facilities are considered poor. The library is mostly stocked with books that were published before 1980 despite the fact that the University of Gadjah Mada is one of the biggest in the country. Practical equipment is not very good although efforts have been made recently to improve the situation. The standard of English in the faculty is in need of improvement since most of the texts used are written in English - students are very keen to improve their language skills. Further education in the field of animal welfare is considered very important but this has been limited so far by financial constraints.

The main interests of the students are in dairy cattle, poultry, wild animals and horses.

The PDHI (which is the Indonesian Veterinarians Association) has taken some initiatives to improve educational standards by:

holding training courses to improve skills in cattle health and breeding, and ensuring that students gain some work assisting practising veterinarians;

holding practitioner club discussions, which are performed by the lecturers of certain topics;

setting up an improved communications network that allows veterinarians to hear about the latest scientific information;

establishing an extension or out-reach service which informs the public about the activities of the veterinarian; and

an institution for veterinary medicine was founded to further the aims of the veterinary profession.

Pakistan, Faisalabad

Problems: Scientific literature and teaching aids are required. (Faculty member)

India, Madras

Literature is in short supply. (Librarian) Students need access to material regarding breeding and preventive medicine. (Graduate veterinarian)

India, Assam

Problems: Much local livestock is considered to be of inferior genetic quality and animal nutrition is very poor. Students lack textbooks and practical equipment. A lot of time is spent learning about diseases of other countries due to foreign authors of their texts. Communication facilities are not good. (Graduate student)

Summary (Asia)

Lack of specialised literature and teaching aids;
Lack of properly qualified teachers;
Poor practical equipment;
Inappropriate courses; and
Foreign aid should be focused more effectively.

Overall Conclusions

The problems most consistently mentioned are clearly the lack of up-to-date scientific literature and useful scientific/clinical equipment. These are items in abundance in the West and a student organization could be very well placed to organise for the collection and redistribution of second-hand textbooks and veterinary instruments.

It is clear that companion animal medicine receives less attention in those countries questioned than do farm animals. Although this cannot be given maximum priority in all nations, it is a subject of great opportunity in Eastern Europe where educational standards must be raised to achieve entry into the EC and where the educational infrastructure for training large animal veterinarians and biologists is already in place.

The chances for selected individuals to travel in order to promote Western skills in their native countries must be encouraged. The I.V.S.A. could probably provide the mechanisms, though not necessarily the funds, to enable this.

It seems that students would benefit a great deal if improvements were made to field work and to practical class exercises.

A shortage of proper teaching aids is a widespread problem.

Animal welfare is a major issue. In many disadvantaged countries, the rights of animals are seen to take second-place to human beings, not unreasonably since most people have a low quality of life too. This is an issue of some importance for us. By improving the lot of the common beast, livestock productivity will undoubtedly improve. In addition, animal welfare will be a key marketing tool in the campaign to raise funds from concerned individuals.

The political dimensions of our research and any forthcoming aid must be handled extremely carefully. Some of those who have replied to me have mentioned political problems which have affected veterinary education. These could be due to uncooperative governments which regard Western interference with suspicion, or authorities within colleges which resent their students having too much contact with the outside world and may feel patronised by offers of support. It is logical to conclude that these problems must be much greater for some of those colleges which have not replied - for example, no replies were received from China. The new avenues of communication which have been opened up by this research must be maintained in order to by-pass officialdom where it is possible and appropriate.

Languages will continue to be of interest in this subject. The leading nations in the field of veterinary research are the USA, the UK, Western Europe and Australasia, most of whom publish in English. The other major scientific languages are German and French. It is desirable to improve the teaching of these languages throughout the world, allowing students to make the most of the literature available to them. In addition, future communications should make some attempt to bridge the language gap between the I.V.S.A. and those countries which have not so far replied to our letters. In particular, the nations of the Far East have contributed little to this project, and one wonders if approaches made in their own languages would have been more successful.

The standards of educational assessment in some universities is probably of dubious quality. A standardisation of matriculation results and course work would be of some value.

In the Third World, the relationship between the veterinary community and local people is of great importance. The veterinary student should be able to function as a useful intermediary since he/she will have knowledge which is of value to rural societies, plus the time and enthusiasm to participate in this sort of exercise. Also, the activities of lay-people in the field of animal health can be seen as being of great value, but also potentially damaging where training is inadequate or where people pretend to have skills which they do not. The I.V.S.A. must give some attention to this matter if we are to claim accurately that we are supporting animal health and not just acting as a worldwide trade union for veterinary students.

We must be very careful to ensure that the assistance we give is used in a way that does not profit those who would like to line their own pockets, which has been the fate of much foreign aid in the past.

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ACKNOWLEDGEMENTS

Members of the Consultation Committee wish to ackowledge with pleasure the many people who provided the organizational and administrative support for a complex meeting of international importance.

To senior members of the Secretariat of FAO, Dr Y. Cheneau, Chief, AGAH; Dr Roger Ruppanner and Dr David E. Ward, Senior Officers, AGAH; Dr Valdir R. Welte, Animal Health Officer, AGAH; and Secretarial Staff, members of the consultation extend their appreciation.

We are also pleased to acknoweldge the important contribution of Dr F.-X. Meslin, Chief, Veterinary Public Health, WHO in providing emphasis on comparative medicine and zoonotic diseases.

From units within FAO, we are grateful to Ms A. Miceli (AGAX), Mr N.M. Hla and Mr A. Martucci (AFFP), Ms V. Emerson (AFPR), Ms L. Badolati and Ms A. Vicerè (GIC) and Ms A. le Clainche (GICO).

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Availability: February 1995

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* Out of print
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This publication is the report of the Fifth Joint FAO/WHO Expert Consultation on Veterinary Education, held in Rome from 7 to 10 September 1993. The objective of the expert consultation was to produce recommendations to serve as international guidelines for the establishment of veterinary education and training programmes and facilities. Previous expert consultations had adequately dealt with topics related to training of the animal health assistant and to postgraduate studies; the present consultation focused on the veterinary curriculum, as seen in the context of the needs for veterinary workers, and on the privatization of the profession. The participants included 15 recognized authorities in veterinary education and representatives from FAO and WHO. Among the 60 recommendations put forth by the experts, the following are of major importance: meeting the urgent need for information services; filling the need for a full-time FAO veterinary education officer; recognizing the increasingly important role of national veterinary associations; pooling resources by regions; and revising traditional teaching methods.

ISBN 92-5-103637-3 ISSN 0254-6019

9 789251 036372

M-27 V4915E/1/3 95/1200